

2004 Chevrolet S10 Pickup

2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

2004 DRIVELINE/AXLE**Front Drive Axle - Blazer/S-10, Jimmy/Sonoma****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS****Fastener Tightening Specifications**

Application	Specification	
	Metric	English
Clutch Cable Coupling Nut	10 N.m	89 lb in
Clutch Cable Hold Down Bolt	17 N.m	13 lb ft
Clutch Cable Housing to Differential Carrier Assembly Bolts	48 N.m	36 lb ft
Differential Bearing Adjuster Sleeve Lock Tab Bolts	8 N.m	71 lb in
Differential Carrier Assembly Case Halves Bolts	50 N.m	37 lb ft
Differential Carrier Assembly Shield Bolts	25 N.m	18 lb ft
Differential Carrier Assembly Shield Bracket Bolt	103 N.m	76 lb ft
Differential Carrier Assembly to Frame Bolts	103 N.m	76 lb ft
Drain Plug	33 N.m	24 lb ft
Fill Plug	33 N.m	24 lb ft
Four Wheel Drive Indicator Switch	5 N.m	44 lb in
Inner Axle Shaft Housing to Differential Carrier Assembly Bolts	48 N.m	36 lb ft
Inner Axle Shaft Housing to Frame Bracket Nuts	98 N.m	72 lb ft
Inner Axle Shaft Seal Cover to Differential Carrier Assembly Bolts	25 N.m	18 lb ft
Pinion Shaft Lock Bolt	33 N.m	24 lb ft
Propeller Shaft Yoke Retainer Bolts	20 N.m	15 lb ft
Ring Gear Bolts	80 N.m	59 lb ft
Vacuum Actuator Bolts	1.4 N.m	13 lb in

AXLE PRELOAD AND BACKLASH SPECIFICATIONS**Axle Preload and Backlash Specifications**

Application	Specification	
	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010 in

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Backlash (Preferred)	0.13-0.18 mm	0.005-0.007 in
Pinion Bearing Preload, New Bearings	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, Used Bearings	1.1-2.3 N.m	10-20 lb in
Pinion and Differential Case Bearing Preload, New Bearings	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	2.8-5.1 N.m	25-45 lb in

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

Application	Type of Material	GM Part Number
Differential Carrier Assembly Case Mating Surfaces	Sealant	1052942 (Canadian P/N 10953466) or equivalent
Front Drive Axle	Lubricant	1052271 (Canadian P/N 10950849) or SAE 80W-90 GL5
Front Drive Axle Inner Shaft Housing to Differential Carrier Assembly	Sealant	1052942 (Canadian P/N 10953466) or equivalent
Pinion Yoke Splines	Sealant	12346004 (Canadian P/N 10953480) or equivalent

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS

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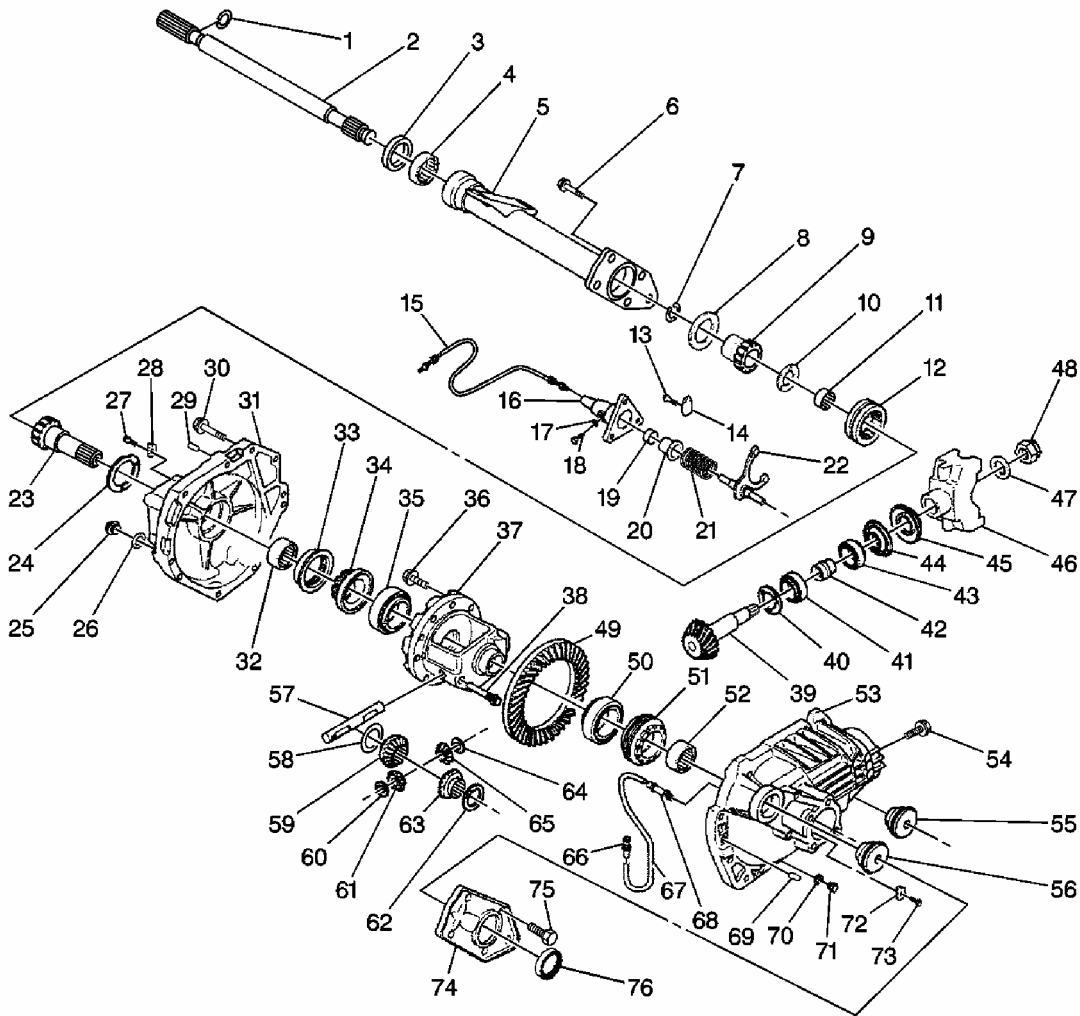


Fig. 1: Front Drive Axle (7.25 in Axle) (S4WD)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Retaining Ring
2	Axle Shaft
3	Seal
4	Bearing
5	Housing
6	Bolt
7	Retaining Ring
8	Washer
9	Clutch Gear
10	Washer

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11	Bearing
12	Clutch Sleeve
13	Bolt
14	Lock
15	Cable
16	Housing
17	Seal
18	Switch
19	Outer Spring
20	Seal
21	Inner Spring
22	Fork
23	Clutch Shaft
24	Washer
25	Drain Plug
26	Drain Plug Gasket
27	Nut
28	Nut Lock
29	Pin
30	Bolt
31	Carrier
32	Bearing
33	Adjuster
34	Sleeve
35	Bearing
36	Bolt
37	Case
38	Bolt
39	Pinion Gear
40	Shim
41	Bearing
42	Spacer
43	Bearing
44	Seal
45	Deflector
46	Yoke
47	Washer
48	Nut
49	

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	Ring Gear
50	Bearing
51	Insert
52	Bearing
53	Carrier
54	Bolt
55	Bushing
56	Bushing
57	Shaft
58	Washer
59	Side Gear
60	Washer
61	Pinion Gear
62	Washer
63	Side Gear
64	Washer
65	Pinion Gear
66	Vent
67	Hose
68	Hose End
69	Pin
70	Drain Plug Gasket
71	Drain Plug
72	Nut Lock
73	Nut
74	Cover
75	Bolt
76	Seal

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - FRONT DRIVE AXLE

Begin the system diagnosis by reviewing the system Description and Operation. Refer to **Front Drive Axle Description and Operation**. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exist. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Front Drive Axle** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

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SYMPTOMS - FRONT DRIVE AXLE

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system functions. Refer to **Front Drive Axle Description and Operation**.

Noise Diagnosis

Any gear-driven unit produces a certain amount of noise that is normal and that conventional repairs or adjustment cannot eliminate. Slight noise that is heard only at a certain speed or under unusual or remote conditions is acceptable. For example, this noise tends to reach a peak at speeds from 60-100 km/h (40-60 mph) depending upon road and load conditions, or upon gear ratio and tire size. Noise of this kind does not indicate trouble in the axle assembly.

When an axle is suspected of being noisy, make a thorough test in order to determine whether the noise originates in the tires, road surface, wheel bearings, engine, transmission, propeller shaft, or axle assembly.

Classifying the Symptom

Front Drive Axle symptoms can usually be classified into the following categories:

- Leaks
- Noises
- Vibrations

Leak and noise related symptoms are diagnosed with the Front Drive Axle section. For vibration related symptoms, refer to **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction for diagnosis.

Visual/Physical Inspection

- Inspect the system for loose or missing fasteners.
- Inspect the system for loose or leaking components.
- Inspect the system for obvious damage or conditions which may cause the symptom.

Symptoms List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom.

- **Front Drive Axle Noises**
- **Noisy in Drive**
- **Noisy When Coasting**

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- **Intermittent Noise**
- **Constant Noise**
- **Noisy on Turns**
- **Front Axle Lubricant Leak Diagnosis**
- **Four-Wheel Drive Does Not Engage (S4WD)Four-Wheel Drive Does Not Engage (A4WD)**
- **Four-Wheel Drive Does Not Disengage (S4WD)Four-Wheel Drive Does Not Disengage (A4WD)**

FRONT DRIVE AXLE NOISES

Gear Noise

Gear noise or whine is audible from 32-89 km/h (20-55 mph) under 4 driving conditions:

- Drive - Acceleration or heavy pull
- Road Load - Vehicle driving load or constant speed
- Float - Using enough throttle to keep the vehicle from driving the engine, the vehicle slows down gradually but the engine still pulls slightly
- Coast - Throttle is closed and the vehicle is in gear

Gear noise most frequently has periods where the noise is more prominent, usually between 48-64 km/h (30-40 mph) and 80-85 km/h (50-53 mph). Gear whine is corrected by ring and pinion gear replacement or adjustment, depending on the mileage of the gear set.

Bearing Noise

Faulty bearings produce a rough growl or grating sound, rather than the whine typical of gear noise. Bearing noise (hum) will pulsate at a constant vehicle speed. This indicates a bad pinion or a bad front axle side bearing. This noise can be confused with front wheel bearing noise. Inspect and replace the bearings and the affected components as required.

Front Wheel Bearing Noise

A rough front wheel bearing produces a noise which continues with the car coasting at low speed and the transmission in neutral. The noise may diminish some when the brakes are gently applied. The noise may also change when performing side-to-side maneuvers with the vehicle.

A rough and/or noisy wheel bearing can be heard by spinning the wheels by hand and listening at the hubs for the noise. Inspect and replace the bearings and the affected components as needed.

Knock at Low Speeds

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A low speed knock can be caused by a differential case side gear bore that has worn oversize. Inspect the side gears and the differential case assembly and replace the components as necessary.

Backlash Clunk

Excessive backlash clunk under acceleration or de-acceleration can be caused by any of the following:

- Worn differential pinion shaft
- Worn differential pinion and/or side gear teeth
- Worn thrust washers
- Excessive clearance between the side gears and the axle shafts
- Excessive clearance between differential side gears and the bore in the case
- Excessive drive pinion and ring gear backlash

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Noisy in Drive

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to <u>Backlash Adjustment (7.6, 8.6 Inch Axle)</u> .
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Worn pinion bearings	Replace the pinion bearings. Refer to <u>Drive Pinion Bearings Replacement</u> .
Loose pinion bearings	Adjust the pinion bearings preload. Refer to <u>Pinion Depth Adjustment</u> .
Excessive pinion end play	Adjust the pinion end play. Refer to <u>Pinion Depth Adjustment</u> .
Worn differential bearings	Replace the differential bearings. Refer to <u>Differential Side Bearings Replacement</u> .
Loose differential bearings	Adjust the differential bearing preload. Refer to <u>Differential Side Bearing Preload Adjustment</u> .
Excessive ring gear runout	Replace the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to <u>Lubricant Level Inspection - Front Drive Axle</u> .
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer

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	to <u>Lubricant Level Inspection - Rear Drive Axle (7.6 Inch Axle)</u> or <u>Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)</u> .
Bent axle housing	Replace the axle housing. Refer to <u>Rear Axle Replacement</u> .

NOISY WHEN COASTING

Noisy When Coasting

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to <u>Differential Carrier Assembly - Disassemble</u> .
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to <u>Backlash Inspection and Adjustment</u> .

INTERMITTENT NOISE

Intermittent Noise

Checks	Action
Warped ring gear	Replace the ring gear. Refer to <u>Differential Carrier Assembly - Disassemble</u> .
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to <u>Differential Case Assembly Assemble</u> and <u>Backlash Inspection and Adjustment</u> .

CONSTANT NOISE

Constant Noise

Checks	Action
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to <u>Differential Carrier Assembly - Disassemble</u> .
Flat spot on the pinion bearing	Replace the bearing. Refer to <u>Differential Carrier Assembly - Disassemble</u> .
Worn pinion splines	Replace the pinion. Refer to <u>Differential Carrier Assembly - Disassemble</u> .

NOISY ON TURNS

Noisy on Turns

Checks	Action
Worn differential side	Replace the differential side gears and pinions. Refer to

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gears and pinions	<u>Differential Case Assembly Disassemble.</u>
Worn differential spider	Replace the spine gears. Refer to <u>Differential Case Assembly Disassemble.</u>
Worn axle shaft splines	Replace the axle shaft. Refer to <u>Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)</u> <u>Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD).</u>

WHEEL BEARING WEAR - FRONT DRIVE AXLE (STRAIGHT)

Straight Roller Bearing Diagnosis

Consider the following factors when diagnosing a bearing condition:

- Note the general condition of all parts during disassembly and inspection.
- Classify the failure with the aid of the illustrations.
- Determine the cause.
- Make all repairs following recommended procedures.

Wear (Minor)

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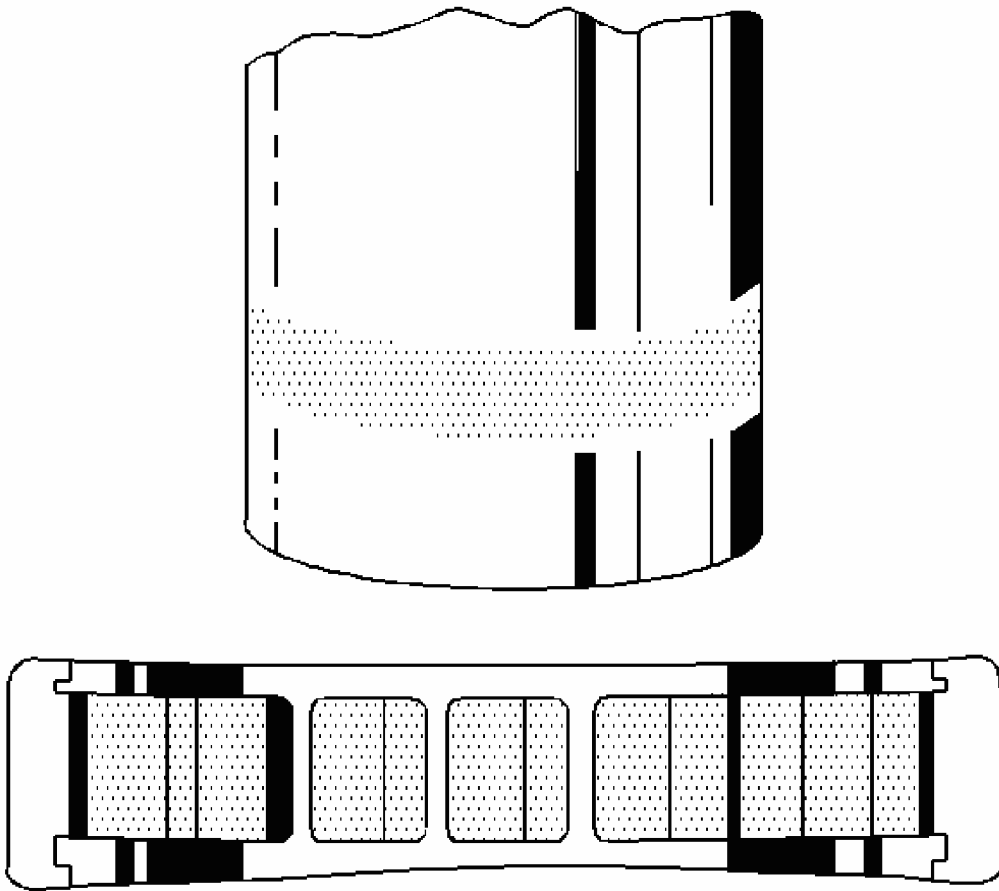


Fig. 2: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

Light pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housings. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Wear (Major)

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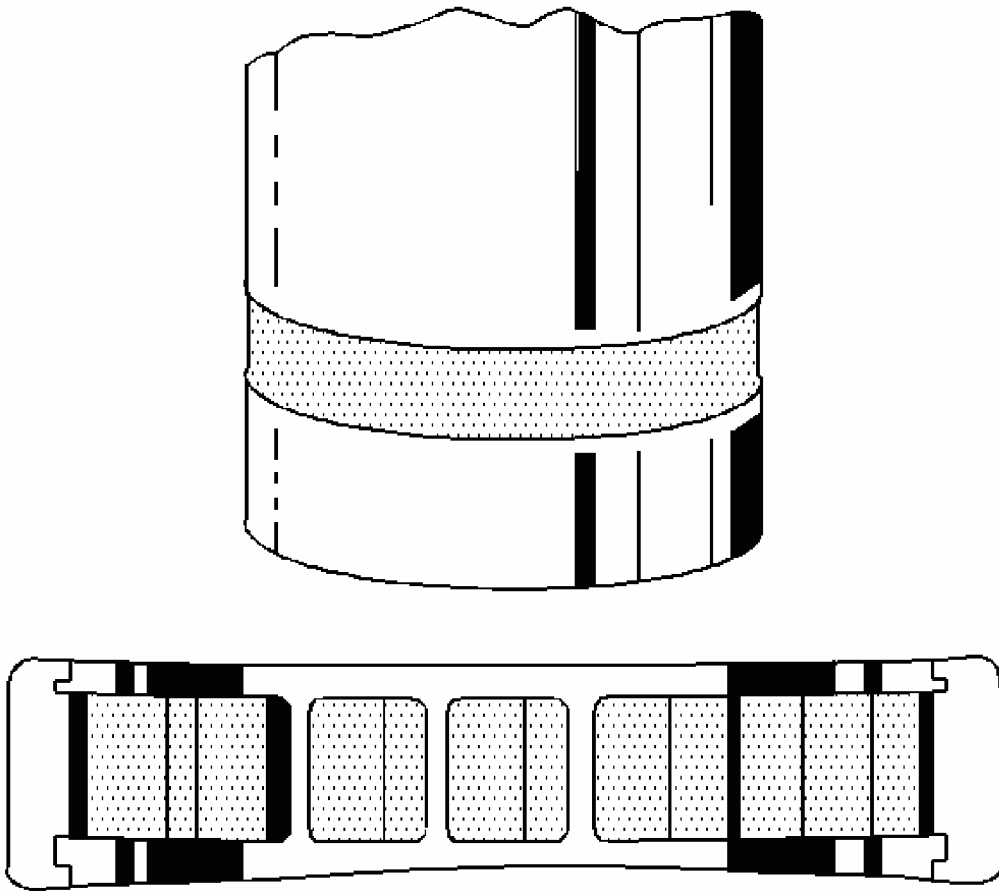


Fig. 3: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

Heavy pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Brinelling

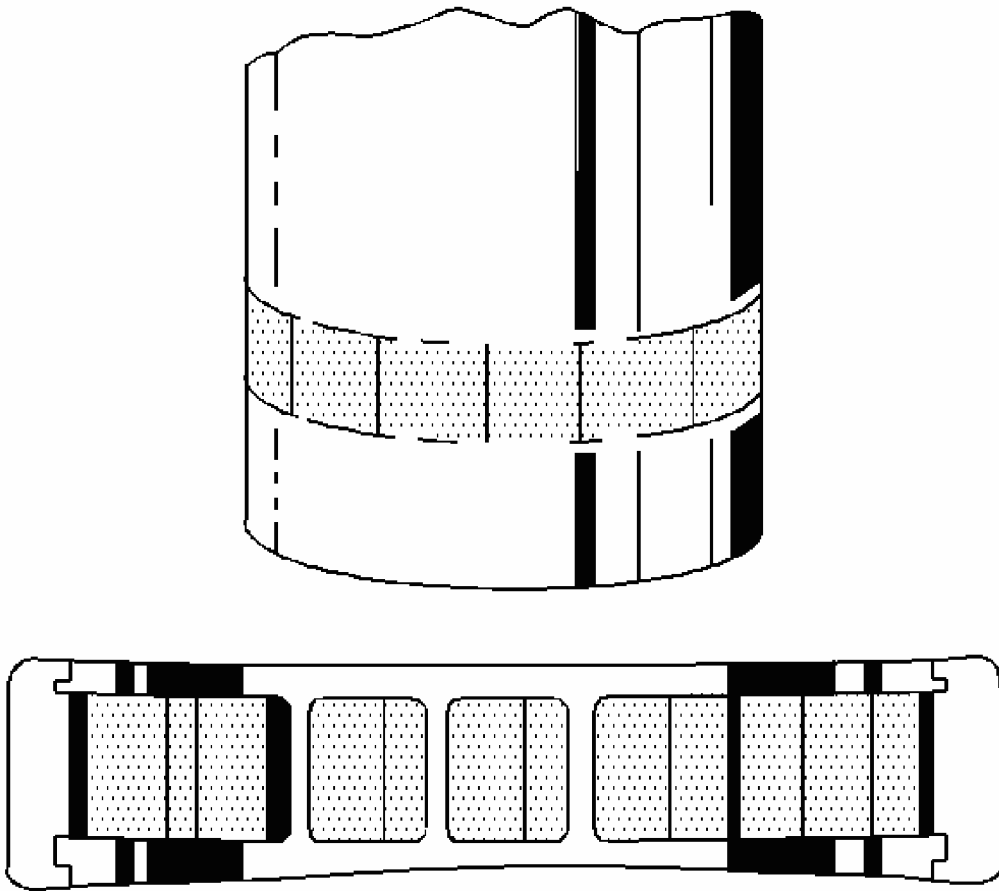


Fig. 4: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the raceway can be caused by roll either under impact loading or vibration while the bearing is not rotating. Replace the bearing if rough or noisy. Replace the shaft if damaged.

Indentations

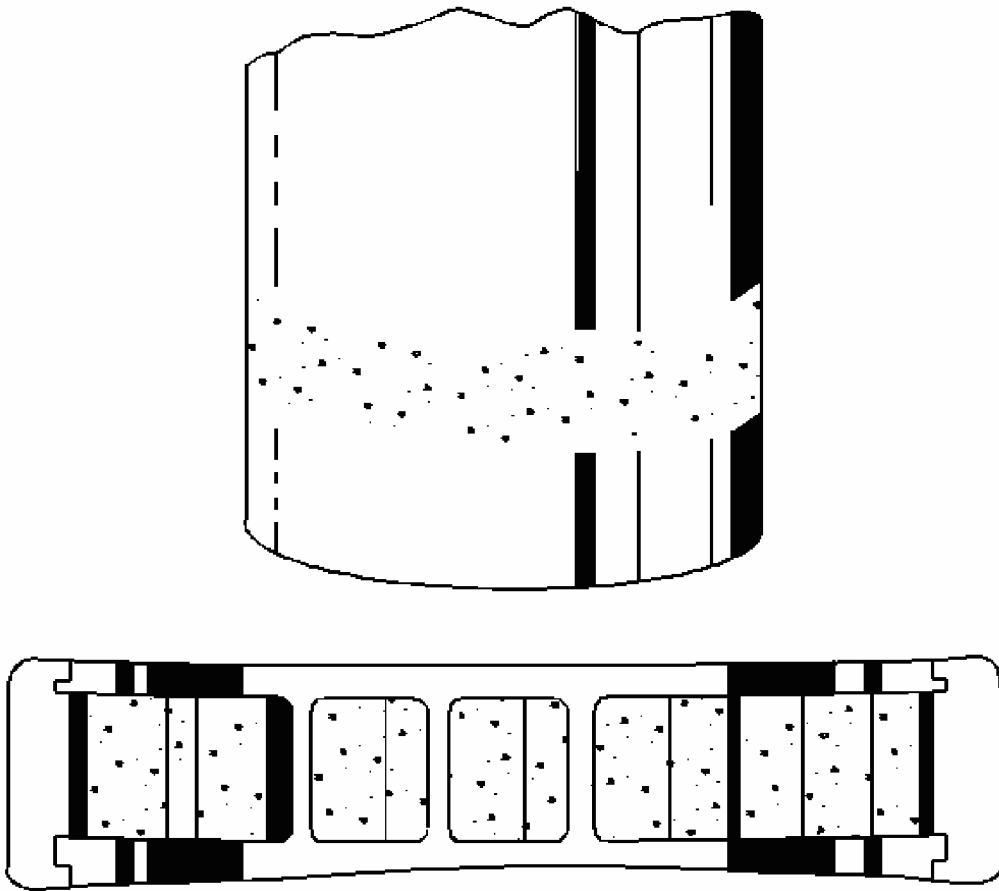


Fig. 5: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

Surface depressions on race and rollers can be caused by hard particles of foreign material. Clean all of the parts, including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Single Edge Pitting

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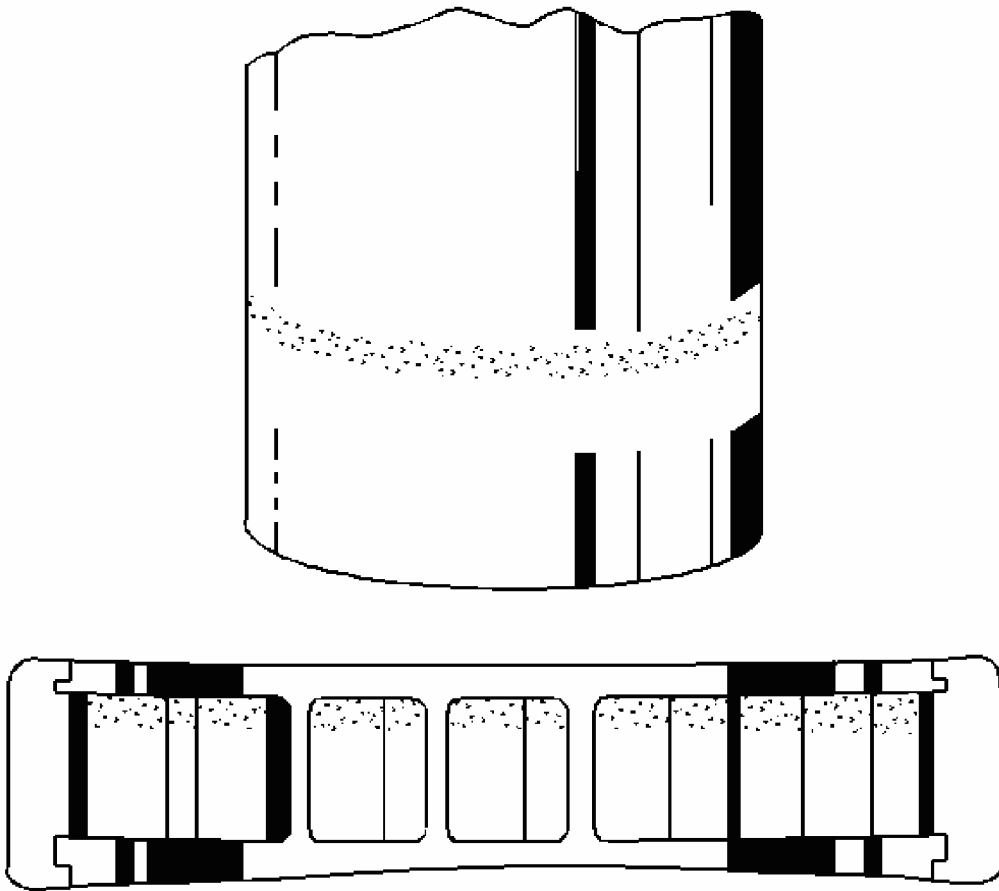


Fig. 6: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at one edge of race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Double Edge Pitting

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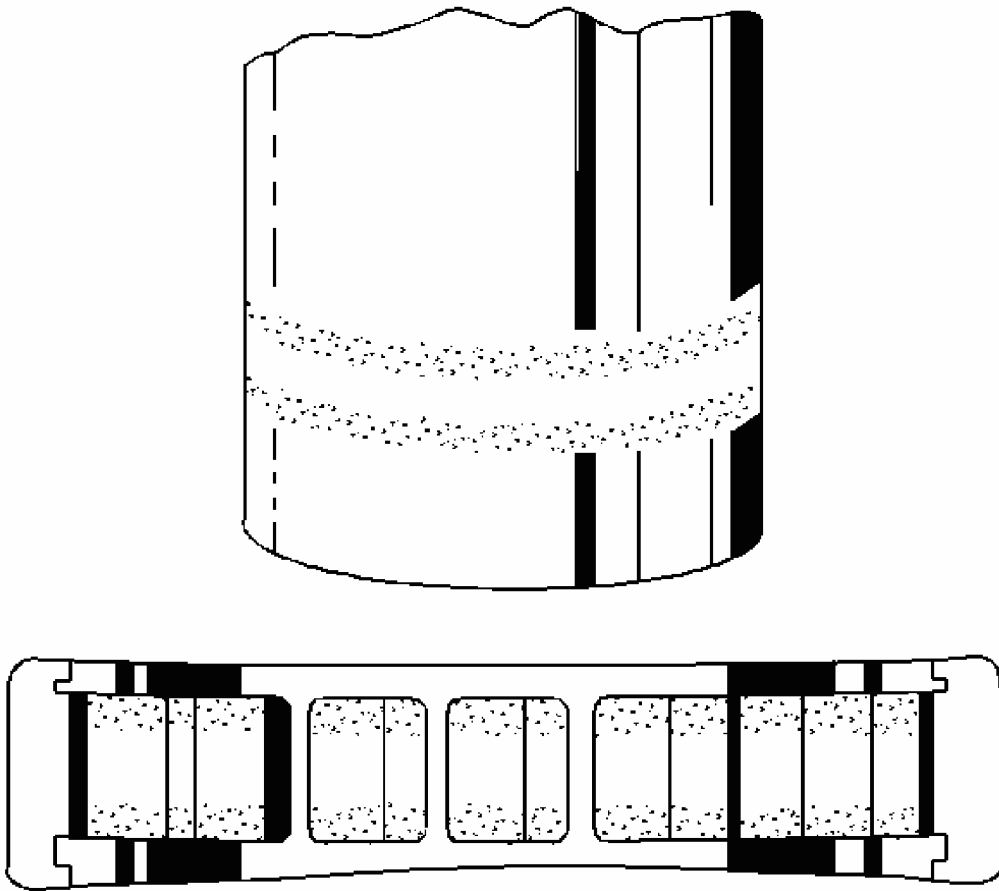


Fig. 7: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at both edges of the race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Misalignment

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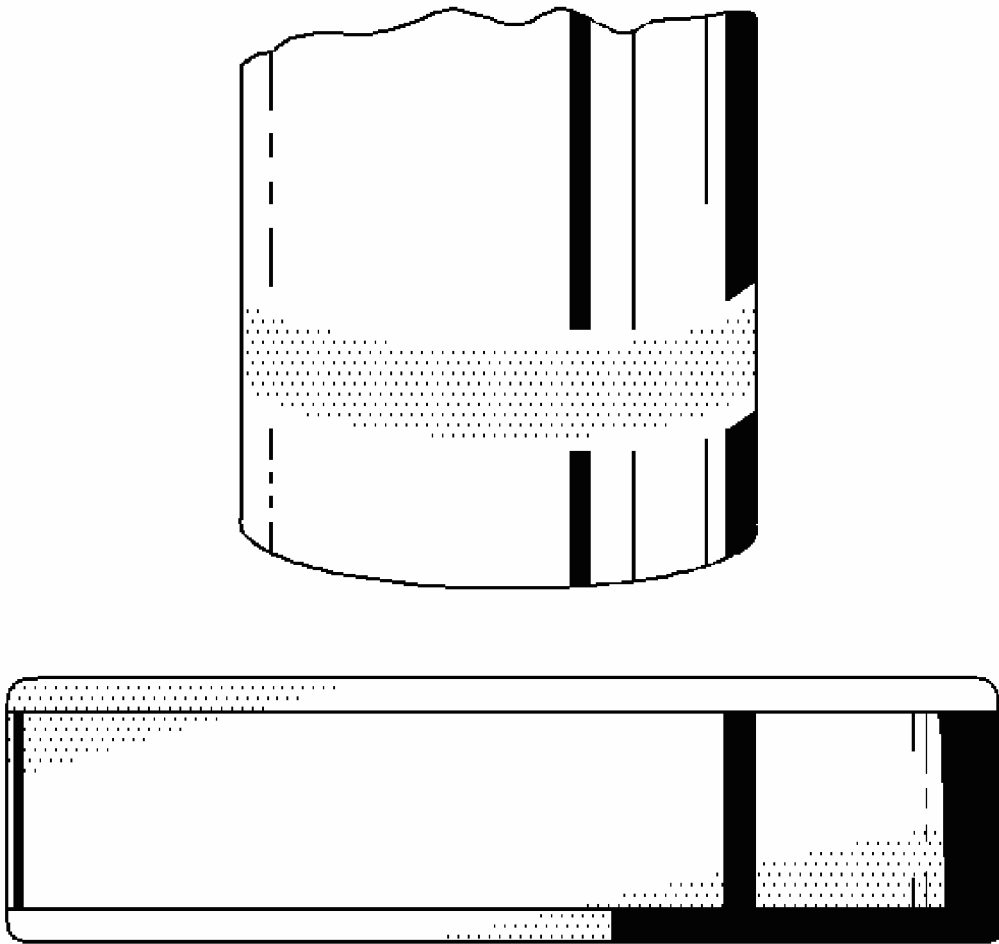


Fig. 8: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

Outer misalignment due to a foreign object. Replace the bearing. Ensure races are properly seated. Replace the shaft if the bearing operating surface is damaged.

Fretting

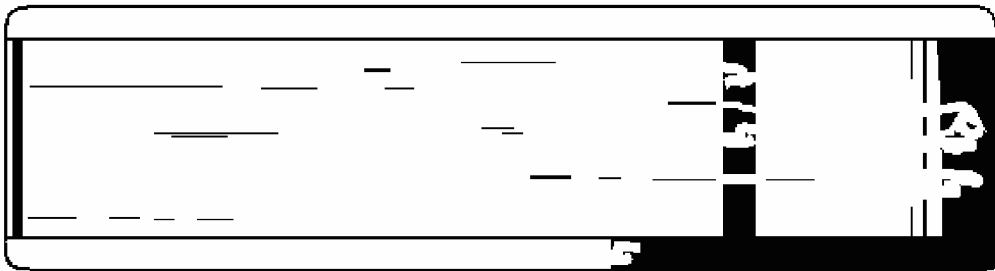
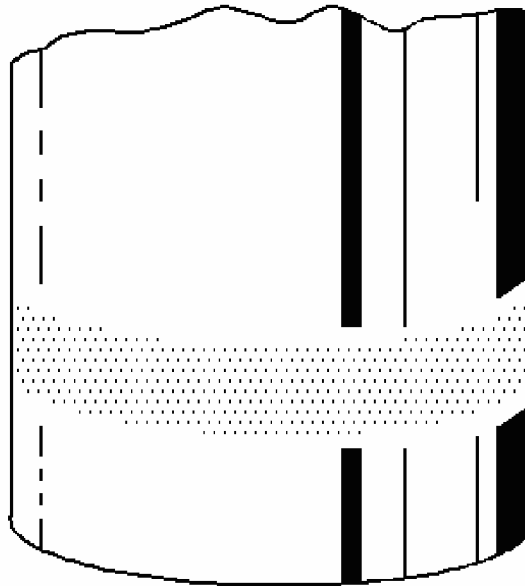


Fig. 9: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

Corrosion set up by a small relative movement of parts with no lubrication. Replace the bearing. Clean all the relative parts. Check the seals. Check for proper fit and lubrication. Replace the shaft if damaged.

Smears

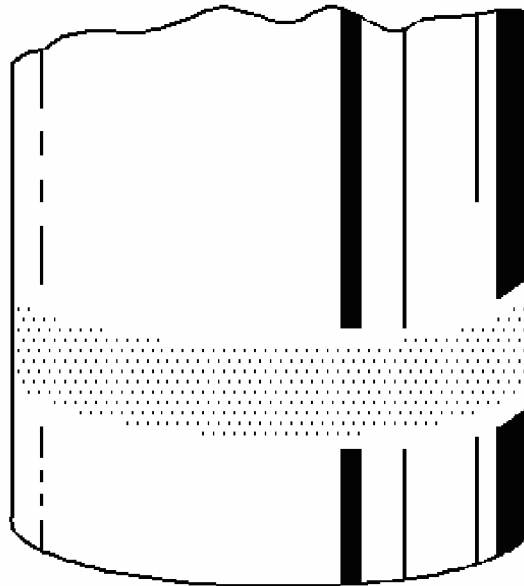


Fig. 10: Identifying Smears

Courtesy of GENERAL MOTORS CORP.

Smearing of metal due to slippage. Slippage can be caused by poor fits, lack of lubrication, overheating, overloads or handling damage. Replace the bearing. Clean all the related parts. Check for proper fit and lubrication.

WHEEL BEARING WEAR - FRONT DRIVE AXLE (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

- General condition of all parts during disassembly and inspection.
- Classify the failure with the aid of the illustrations.

- Determine the cause.
- Make all repairs following recommended procedures.

Abrasive Roller Wear

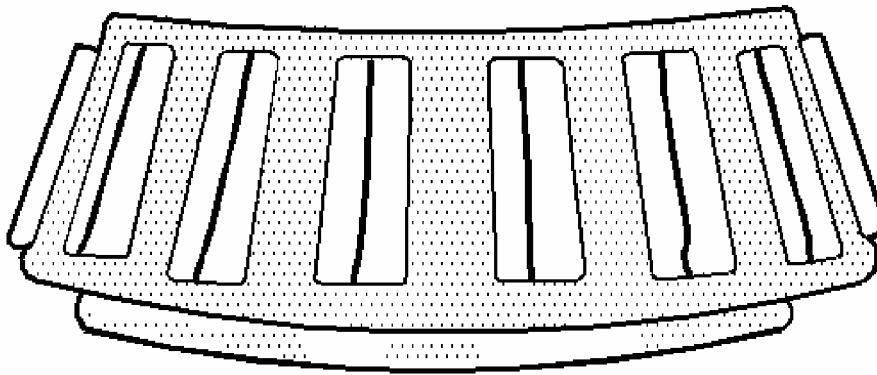
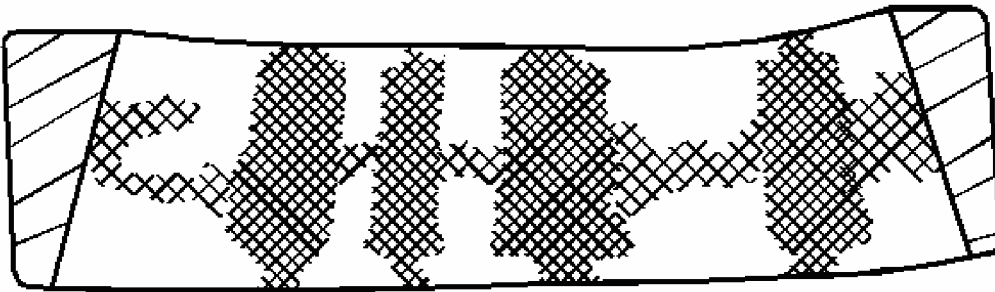


Fig. 11: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the races and the rollers caused by fine abrasives. Clean all of the parts and the housings. Check the seals and the bearings. Replace any leaky, rough, or noisy bearings.

Abrasive Step Wear

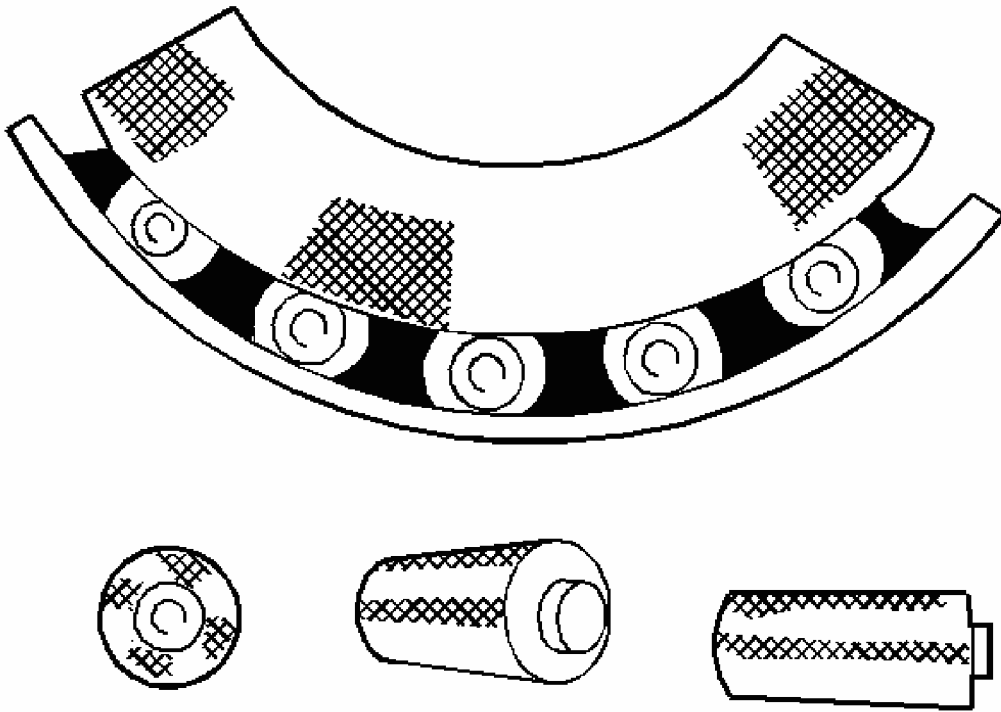


Fig. 12: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the roller ends caused by fine abrasives. Clean all of the parts and the housings. Check the seals and the bearings. Replace any leaky, rough, or noisy bearings.

Galling

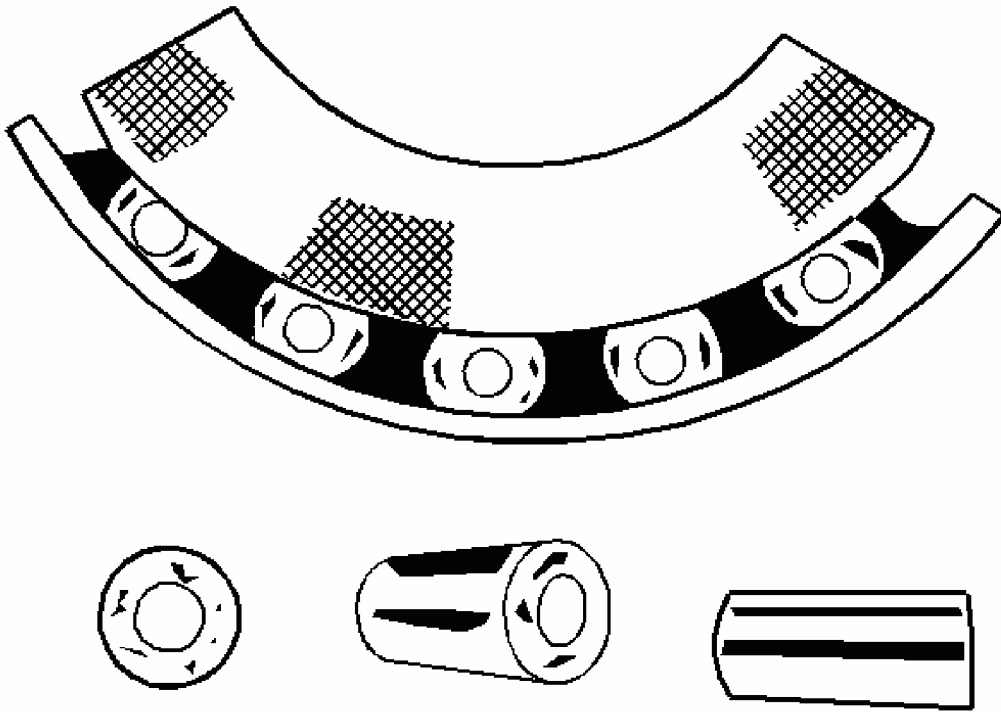


Fig. 13: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

Metal smears on the roller ends due to overheating, lubricant failure, or lubricant overload. Replace the bearing. Check the seals. Check for proper lubrication.

Etching

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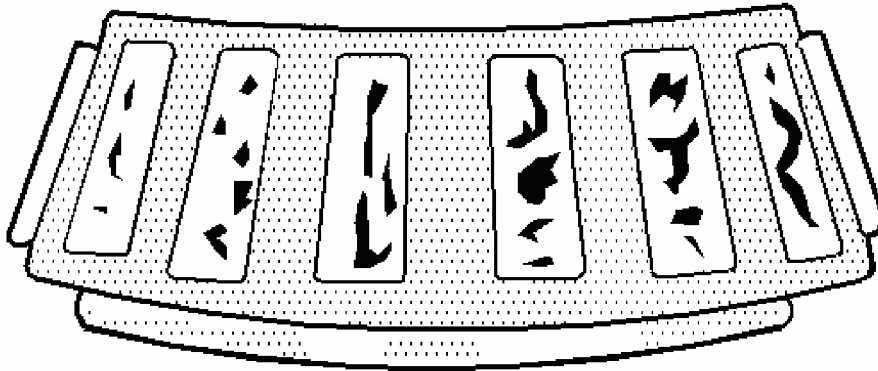
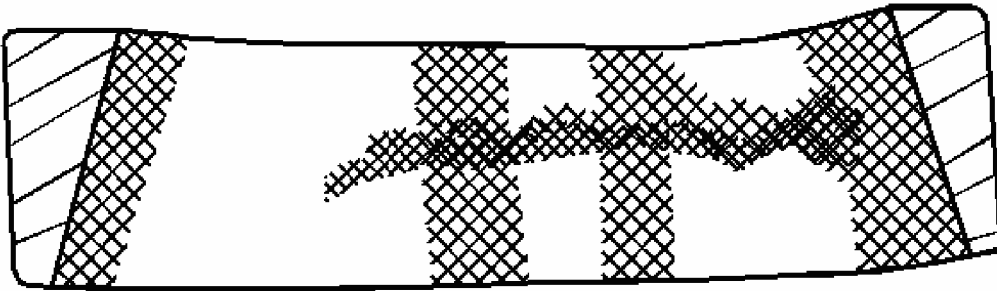


Fig. 14: Identifying Etching
Courtesy of GENERAL MOTORS CORP.

Bearing surfaces appear gray or grayish black in color, with related etching away of material usually at roller spacing. Replace the bearings. Check the seals. Check for proper lubrication.

Bent Cage

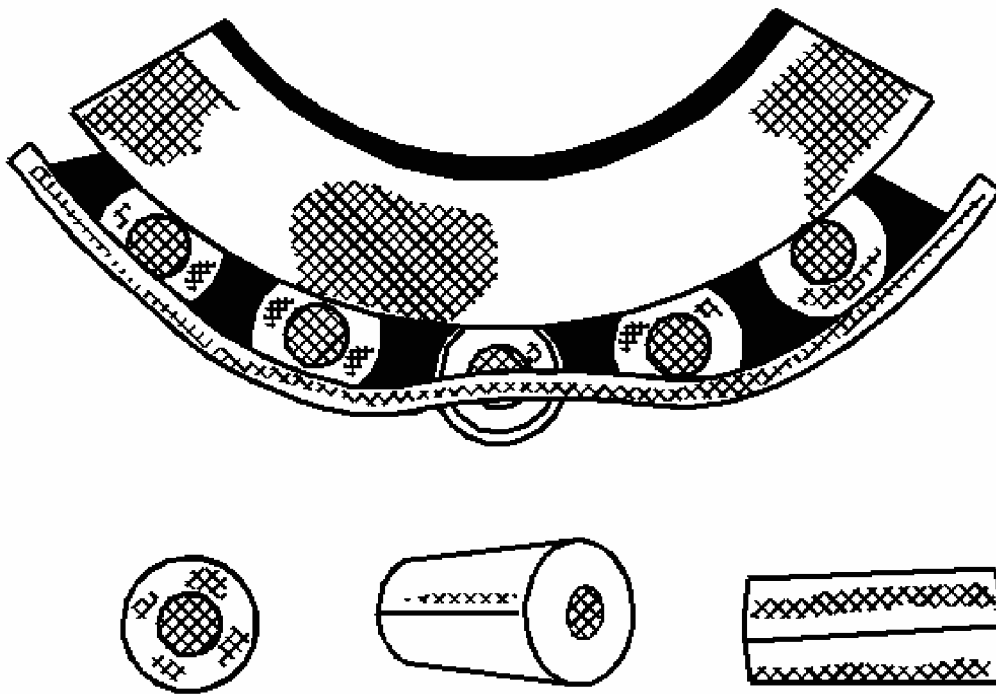


Fig. 15: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

A damaged cage due to improper handling or improper tool usage. Replace the bearing.

Cage Wear

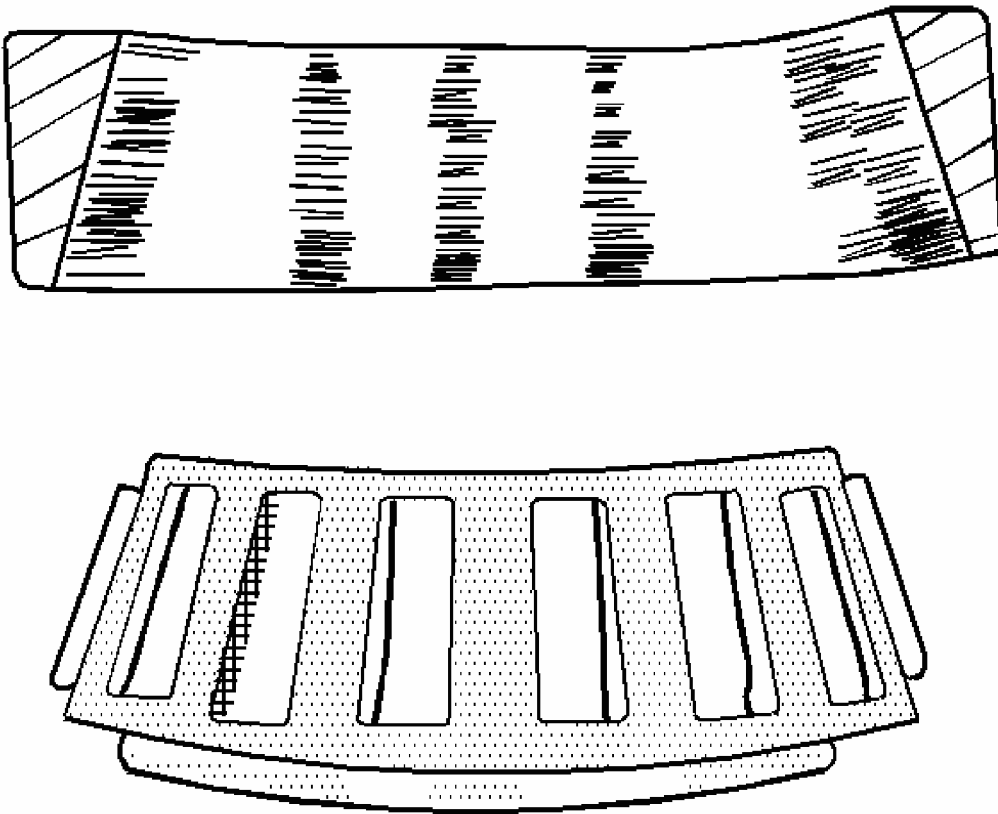


Fig. 16: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

Wear around the outside diameter of the cage and the roller pockets caused by abrasive material. Wear caused from inefficient lubrication. Clean the related parts and the housings. Check the seals. Replace the bearings.

Indentations

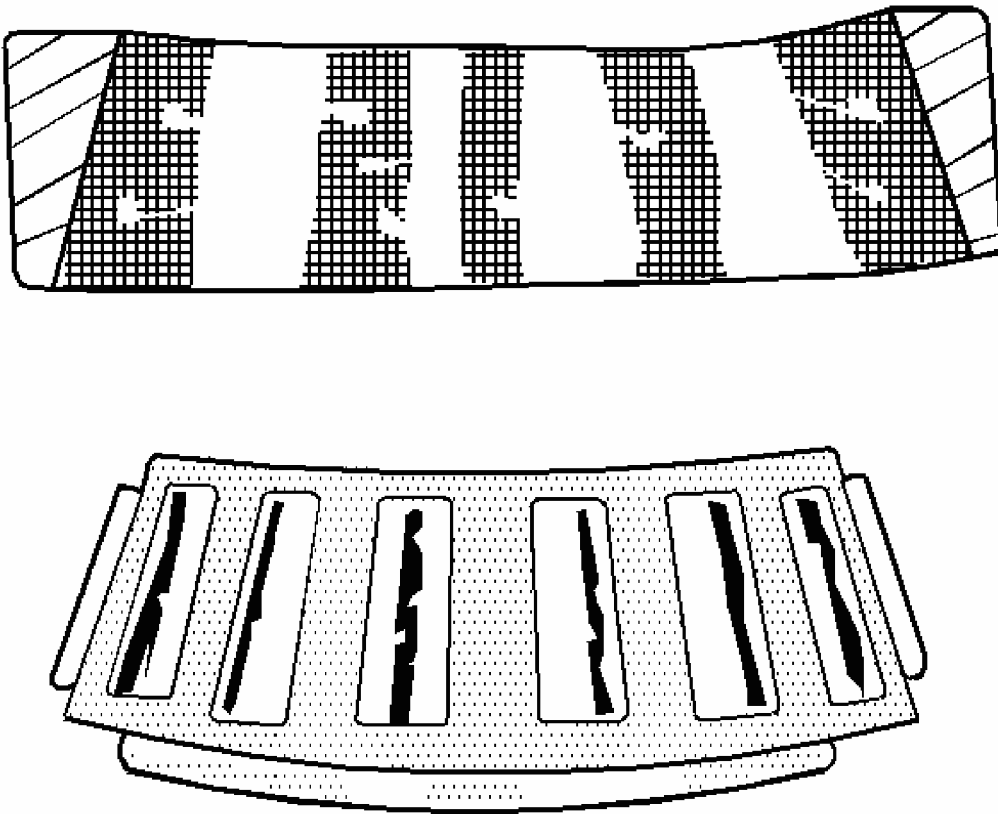


Fig. 17: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

Surface depressions on the race and the rollers caused by hard particles of foreign matter. Clean all the parts and the housings. Check the seals. Replace rough or noisy bearings.

Fretting

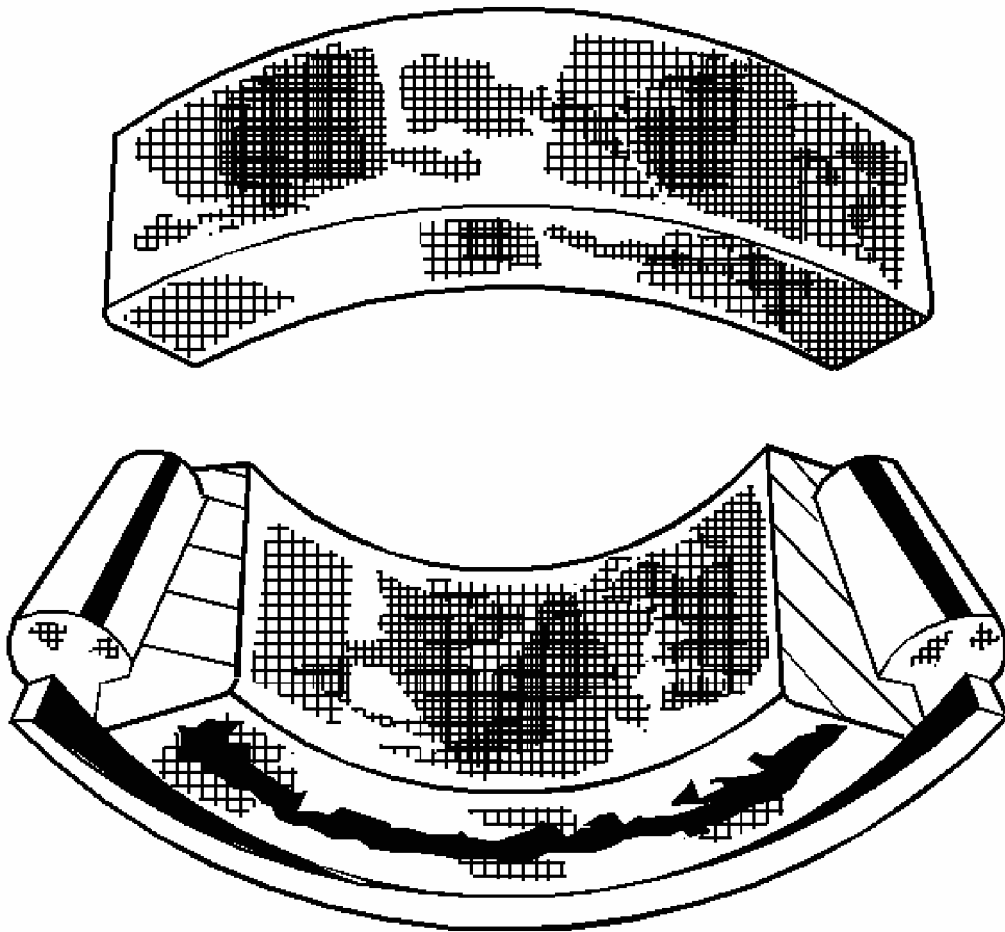


Fig. 18: Identifying Fretting
Courtesy of GENERAL MOTORS CORP.

Corrosion caused by small relative movement of parts with no lubrication. Replace the bearing. Clean the related parts. Check the seals. Check for proper lubrication.

Smears

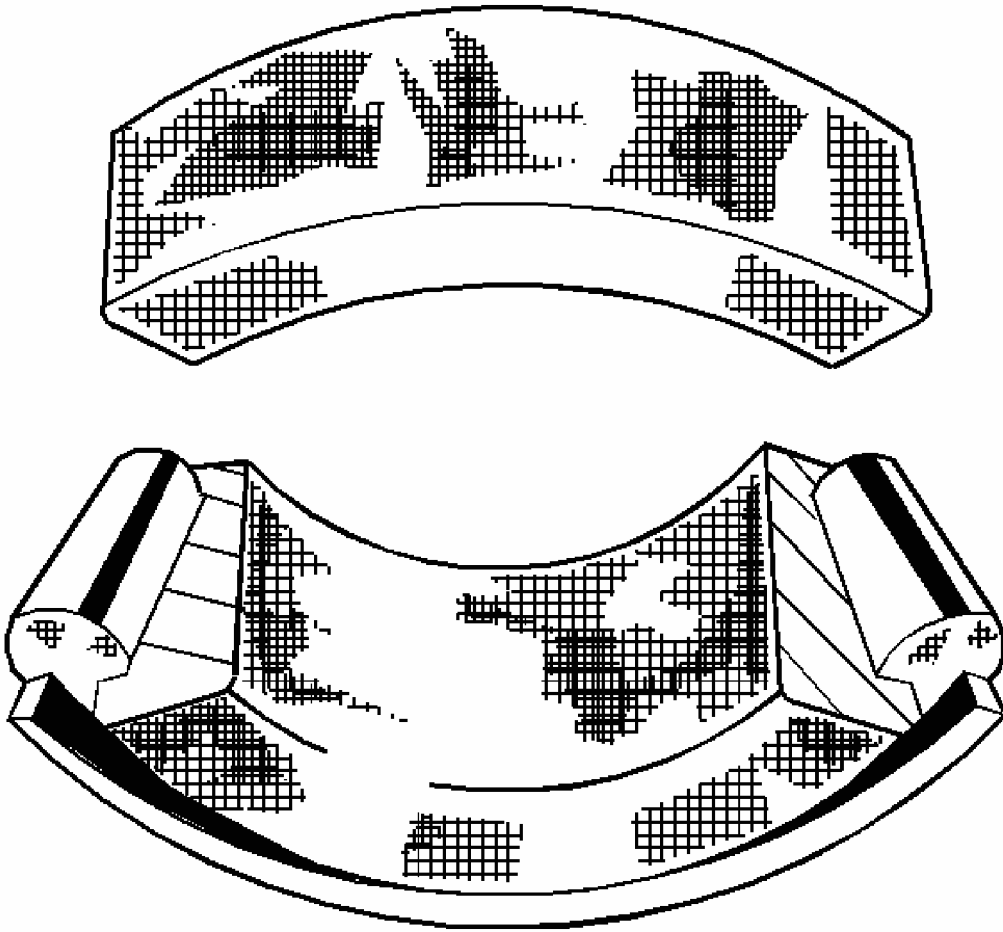


Fig. 19: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of the metal due to slippage. Slippage can be caused by the following factors:

- Poor fits
- Lubrication
- Overheating
- Overloads
- Handling damage

Replace the bearings. Clean the related parts. Check for proper fit and lubrication.

Stain Discoloration

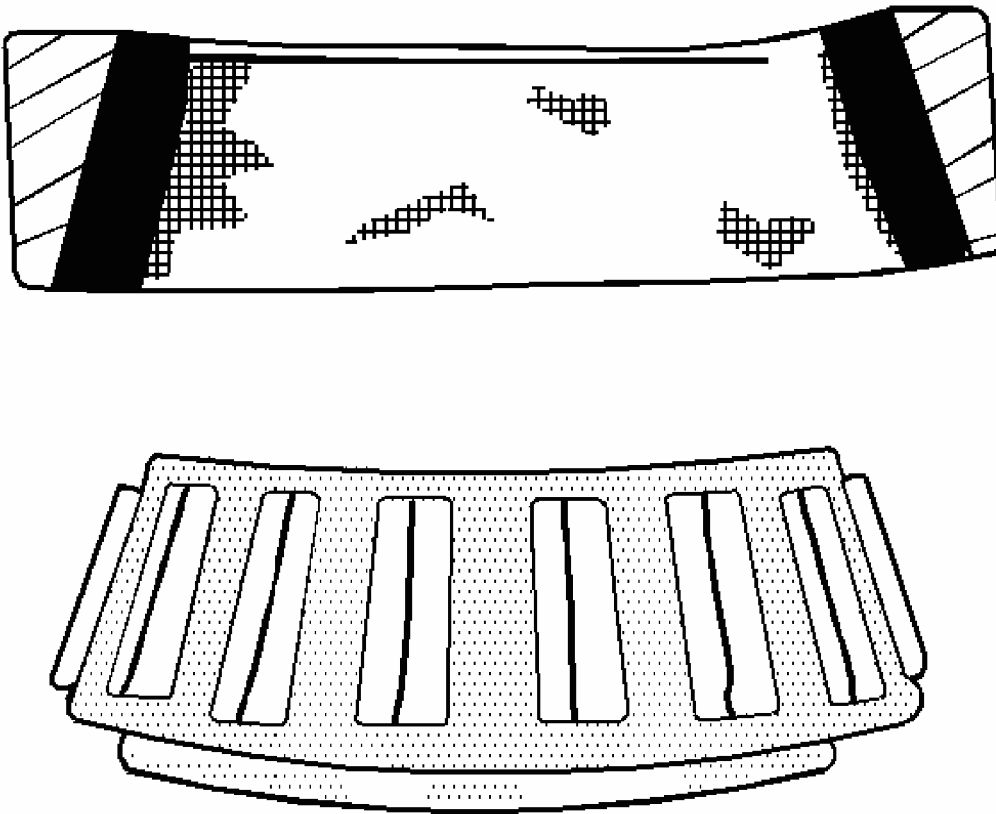


Fig. 20: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

Discoloration ranging from light brown to black. This discoloration is caused from incorrect lubrication or moisture. Reuse the bearing if you can remove the stains with light polishing. Reuse the bearing if there is no evidence of overheating. Check the seals and the related parts for damage.

Heat Discoloration

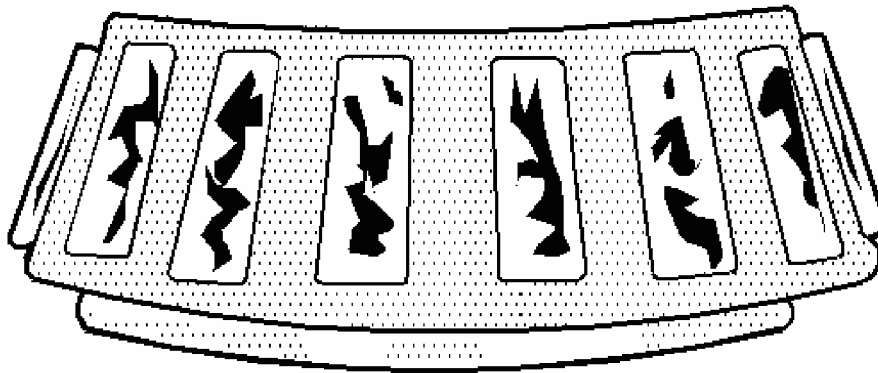
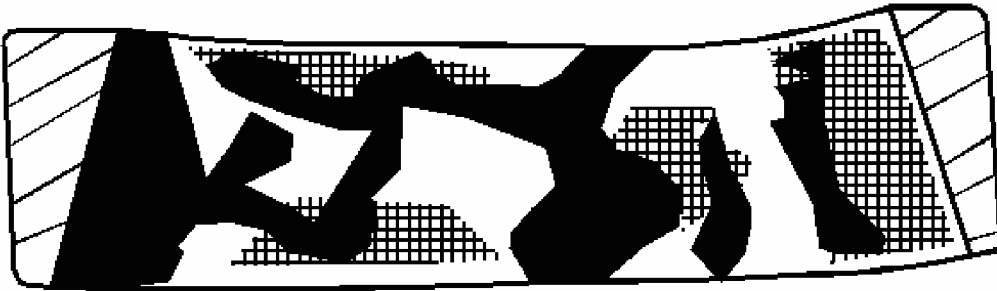


Fig. 21: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

Heat discoloration ranges from faint yellow to dark blue. This discoloration results from overload or an incorrect lubricant. Excessive heat causes softening of the races or the rollers. In order to check for loss of temper on the races and the rollers, perform a file test. A file drawn over a tempered part will grab and cut the metal. A file drawn over a hard part will glide readily with no metal cutting. Replace the bearings if overheating damage is indicated. The tempered part will fail the file test. Check the seals and the other related parts.

Misalignment

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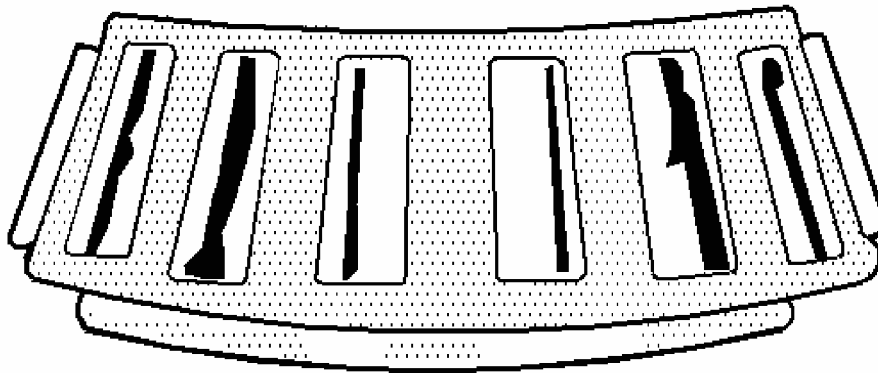
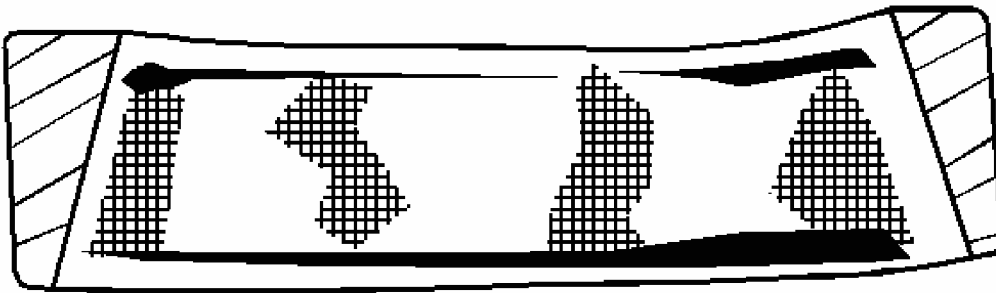


Fig. 22: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

A misaligned outer race due to a foreign object. Clean the related parts. Replace the bearing. Ensure the races are properly sealed.

Cracked Inner Race

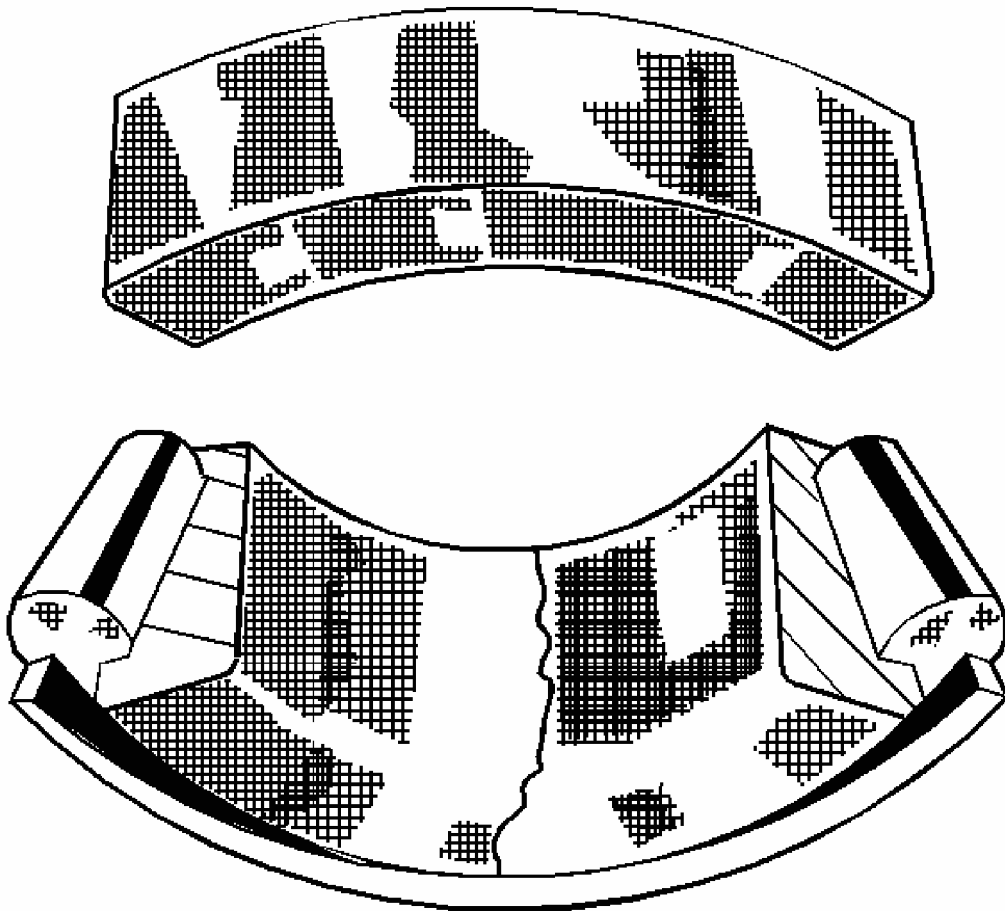


Fig. 23: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

Cracked race due to improper fit, cocking, or poor bearing seats. Replace the bearing.
Correct bearing seats.

Fatigue Spalling

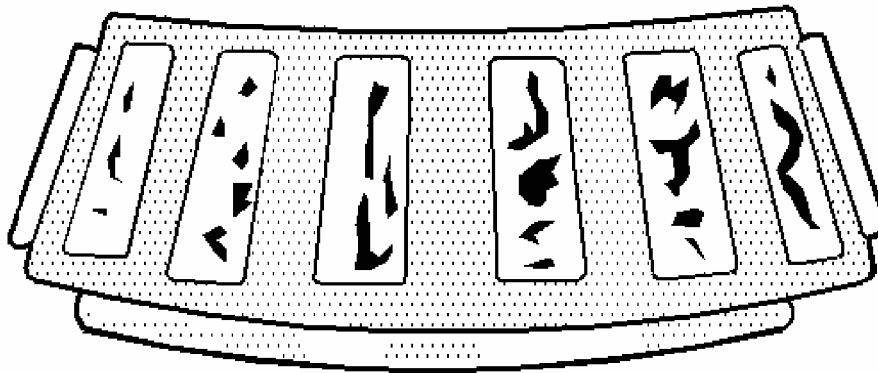
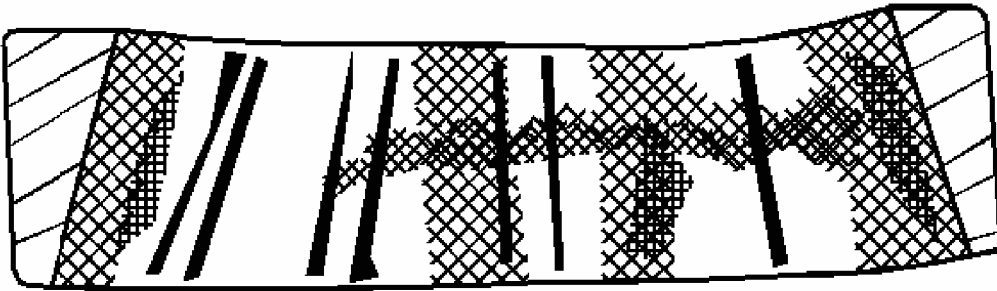


Fig. 24: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear

Courtesy of GENERAL MOTORS CORP.

Flaked surface metal that results from fatigue. Replace the bearing. Clean all related parts.

Brinelling

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

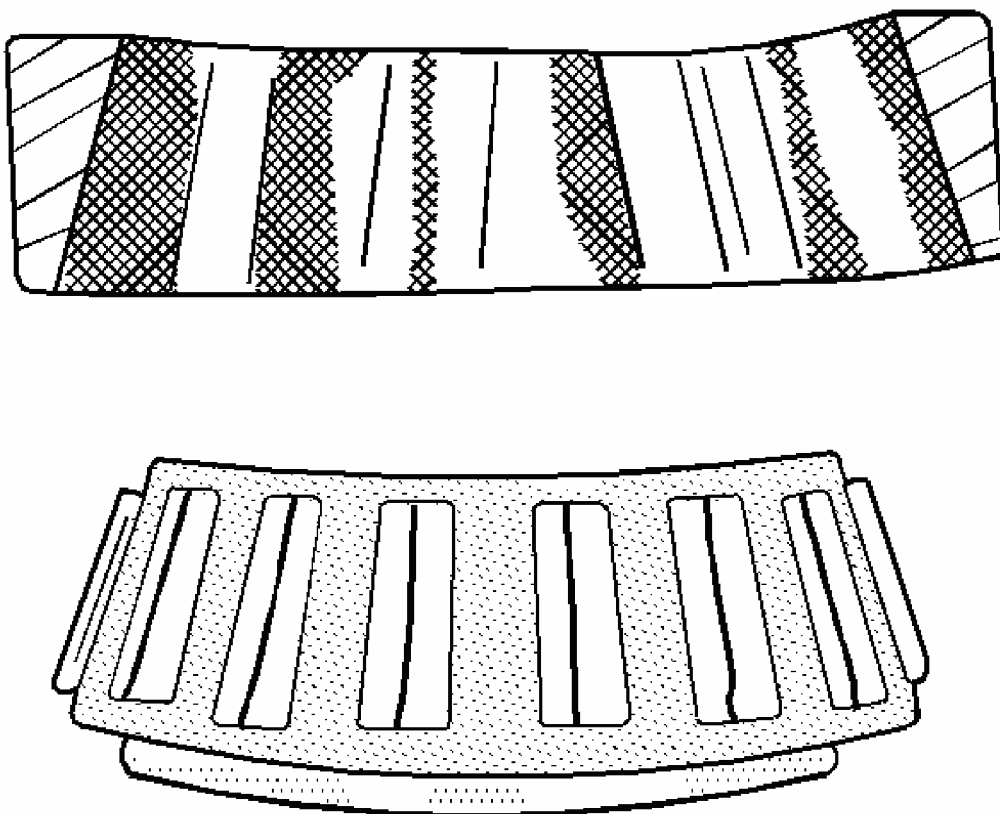


Fig. 25: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the race way caused by the rollers under impact loading or caused from vibration while the bearing is not rotating. Replace a rough or noisy bearing.

FOUR-WHEEL DRIVE DOES NOT ENGAGE (S4WD)

Four-Wheel Drive Does Not Engage (S4WD)

Step	Action	Yes	No
1	Were you sent here from a symptom table?	Go to Step 2	Go to <u>Diagnostic Starting Point - Front Drive Axle</u>
	Check the transfer case shift control module for DTC's. Refer to <u>Diagnostic Trouble Code (DTC) Displaying</u> in Transfer Case -	Go to <u>Diagnostic System Check -</u>	

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

2	NVG 233-NP1. Are any DTCs present?	Transfer Case in Transfer Case - NVG 233-NP1	Go to Step 3
3	Inspect the vacuum hoses for the following: <ul style="list-style-type: none"> • Kinks • Plugged • Damage • Disconnected Are the vacuum hoses kinked, plugged, damaged, or disconnected?	Go to Step 4	Go to Step 5
4	Repair or replace the vacuum hoses as necessary. Does the front drive axle engage?	System OK	Go to Step 5
5	1. Press the 4HI button to attempt to engage the front drive axle. 2. Disconnect the vacuum hose from the vacuum actuator. 3. Inspect for vacuum at the vacuum actuator. Is there vacuum at the vacuum actuator connection?	Go to Step 6	Go to Step 7
6	Replace the vacuum actuator. Refer to <u>Actuator Replacement - Front Drive Axle</u> . Does the front drive axle engage?	System OK	Go to Step 8
7	Replace the vacuum actuator switch. Refer to <u>Transfer Case Vacuum Switch Replacement</u> in Transfer Case - NVG 233-NP1. Does the front drive axle engage?	System OK	Go to Step 8
8	Inspect the clutch cable for the following: <ul style="list-style-type: none"> • Damage • Binding • Disconnected 		

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

	Is the clutch cable damaged, binding or disconnected?	Go to Step 9	Go to Step 10
9	Replace the clutch cable. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u> . Does the front drive axle engage?	System OK	Go to Step 10
10	1. Disconnect the clutch cable from the clutch fork. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u> . 2. Inspect the operation of the clutch fork using the J 33798 . Does the front drive axle engage?	System OK	Go to Step 11
11	Replace the clutch fork. Refer to <u>Clutch Fork Replacement - Front Drive Axle</u> . Does the front drive axle engage?	System OK	Go to Step 12
12	The cause of concern may be in the front drive axle. Disassemble the front drive axle. Inspect for damaged components and repair as necessary. Refer to <u>Differential Carrier Assembly - Disassemble</u> . Does the front drive axle engage?	System OK	Go to Step 1

FOUR-WHEEL DRIVE DOES NOT ENGAGE (A4WD)

Four-Wheel Drive Does Not Engage (A4WD)

Step	Action	Yes	No
1	Were you sent here from a symptom table?	Go to Step 2	Go to <u>Diagnostic Starting Point - Front Drive Axle</u>
2	1. Start the engine. 2. Inspect the instrument panel to see if the Service 4WD light is illuminated. Does the Service 4WD light stay illuminated with the engine running?	Go to <u>Diagnostic System Check - Transfer Case</u> in Transfer Case - NVG 236/246 - NP8	Go to Step 3
	Inspect the vacuum hoses for the following: <ul style="list-style-type: none"> • Kinks • Plugged 		

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

3	<ul style="list-style-type: none"> • Damage • Disconnected <p>Are the vacuum hoses kinked, plugged, damaged, or disconnected?</p>	Go to Step 4	Go to Step 5
4	<p>Repair or replace the vacuum hoses as necessary.</p> <p>Does the front drive axle engage?</p>	System OK	Go to Step 5
5	<ol style="list-style-type: none"> 1. Press the 4HI button to attempt to engage the front drive axle. 2. Disconnect the vacuum hose from the vacuum actuator. 3. Inspect for vacuum at the vacuum actuator. <p>Is there vacuum at the vacuum actuator connection?</p>	Go to Step 6	Go to Step 7
6	<p>Replace the vacuum actuator. Refer to <u>Actuator Replacement - Front Drive Axle</u>.</p> <p>Does the front drive axle engage?</p>	System OK	Go to Step 8
7	<p>Replace the vacuum actuator solenoid valve. Refer to <u>Vacuum Actuator Solenoid Valve Replacement</u>.</p> <p>Does the front drive axle engage?</p>	System OK	Go to Step 8
8	<p>Inspect the clutch cable for the following:</p> <ul style="list-style-type: none"> • Damage • Binding • Disconnected <p>Is the clutch cable damaged, binding or disconnected?</p>	Go to Step 9	Go to Step 10
9	<p>Replace the clutch cable. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u>.</p> <p>Does the front drive axle engage?</p>	System OK	Go to Step 10
	<ol style="list-style-type: none"> 1. Disconnect the clutch cable from the clutch fork. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u>. 		

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

10	2. Inspect the operation of the clutch fork using the J 33798 . Does the front drive axle engage?	System OK	Go to Step 11
11	Replace the clutch fork. Refer to Clutch Fork Replacement - Front Drive Axle . Does the front drive axle engage?	System OK	Go to Step 12
12	The cause of concern may be in the front drive axle. Disassemble the front drive axle. Inspect for damaged components and repair as necessary. Refer to Differential Carrier Assembly - Disassemble . Does the front drive axle engage?	System OK	Go to Step 1

FOUR-WHEEL DRIVE DOES NOT DISENGAGE (S4WD)

Four-Wheel Drive Does Not Disengage (S4WD)

Step	Action	Yes	No
1	Were you sent here from a symptom table?	Go to Step 2	Go to Diagnostic Starting Point - Front Drive Axle
2	Check the transfer case shift control module for DTC's. Refer to Diagnostic Trouble Code (DTC) Displaying in Transfer Case - NVG 233-NP1. Are any DTCs present?	Go to Diagnostic Trouble Code (DTC) List in Transfer Case - NVG 233-NP1	Go to Step 3
3	Inspect the vacuum hoses for the following: <ul style="list-style-type: none"> • Kinks • Plugged • Damage Are the vacuum hoses kinked, plugged, or damaged?	Go to Step 4	Go to Step 5
4	Repair or replace the vacuum hoses as necessary. Does the front drive axle disengage?	System OK	Go to Step 5
	1. Disconnect the vacuum hose at the		

2004 Chevrolet S10 Pickup

2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

5	<p>vacuum actuator.</p> <p>2. Inspect the vacuum actuator for movement.</p> <p>Does the vacuum actuator move to disengage the front drive axle?</p>	Go to Step 6	Go to Step 7
6	<p>Replace the vacuum actuator switch. Refer to <u>Transfer Case Vacuum Switch Replacement</u> in Transfer Case - NVG 233-NP1.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 8
7	<p>Replace the vacuum actuator. Refer to <u>Actuator Replacement - Front Drive Axle</u>.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 8
8	<p>Inspect the clutch cable for the following:</p> <ul style="list-style-type: none"> • Damage • Binding <p>Is the clutch cable damaged or binding?</p>	Go to Step 9	Go to Step 10
9	<p>Replace the clutch cable. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u>.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 10
10	<p>1. Disconnect the clutch cable from the clutch fork. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u>.</p> <p>2. Inspect the operation of the clutch fork using the J 33798.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 11
11	<p>Replace the clutch fork. Refer to <u>Clutch Fork Replacement - Front Drive Axle</u>.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 12
12	<p>The cause of concern may be in the front drive axle. Disassemble the front drive axle. Inspect for damaged components. Refer to <u>Differential Carrier Assembly - Disassemble</u>.</p> <p>Does the front drive axle disengage?</p>	System OK	Go to Step 1

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

FOUR-WHEEL DRIVE DOES NOT DISENGAGE (A4WD)**Four-Wheel Drive Does Not Disengage (A4WD)**

Step	Action	Yes	No
1	Were you sent here from a symptom table?	Go to Step 2	Go to <u>Diagnostic Starting Point - Front Drive Axle</u>
2	1. Start the engine. 2. Inspect the instrument panel to see if the Service 4WD light is illuminated. Does the Service 4WD light stay illuminated with the engine running?	Go to <u>Diagnostic System Check - Transfer Case</u> in Transfer Case - NVG 236/246-NP8	Go to Step 3
3	Inspect the vacuum hoses for the following: <ul style="list-style-type: none"> • Kinks • Plugged • Damage Are the vacuum hoses kinked, plugged, or damaged?	Go to Step 4	Go to Step 5
4	Repair or replace the vacuum hoses as necessary. Does the front drive axle disengage?	System OK	Go to Step 5
5	1. Disconnect the vacuum hose at the vacuum actuator. 2. Inspect the vacuum actuator for movement. Does the vacuum actuator move to disengage the front drive axle?	Go to Step 6	Go to Step 7
6	Replace the vacuum actuator solenoid valve. Refer to <u>Vacuum Actuator Solenoid Valve Replacement</u> . Does the front drive axle disengage?	System OK	Go to Step 8
7	Replace the vacuum actuator. Refer to <u>Actuator Replacement - Front Drive Axle</u> .		

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

	Does the front drive axle disengage?	System OK	Go to Step 8
8	Inspect the clutch cable for the following: <ul style="list-style-type: none">• Damage• Binding Is the clutch cable damaged or binding?	Go to Step 9	Go to Step 10
9	Replace the clutch cable. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u> . Does the front drive axle disengage?	System OK	Go to Step 10
10	1. Disconnect the clutch cable from the clutch fork. Refer to <u>Clutch Cable Replacement - Front Drive Axle</u> . 2. Inspect the operation of the clutch fork using the J 33798 . Does the front drive axle disengage?	System OK	Go to Step 11
11	Replace the clutch fork. Refer to <u>Clutch Fork Replacement - Front Drive Axle</u> . Does the front drive axle disengage?	System OK	Go to Step 12
12	The cause of concern may be in the front drive axle. Disassemble the front drive axle. Inspect for damaged components. Refer to <u>Differential Carrier Assembly - Disassemble</u> . Does the front drive axle disengage?	System OK	Go to Step 1

FRONT AXLE LUBRICANT LEAK DIAGNOSIS

Front axle lubricant leaks can occur at the following locations:

- Axle shaft oil seals
- Differential carrier assembly mating surface
- Drain plug
- Fill plug
- Inner axle tube assembly to differential carrier assembly mating surface
- Pinion yoke oil seal
- Vent tube

Determining the Cause

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

While most front axle leaks may be easy to find, determining the cause may not be. A thorough inspection of the area around the leak may assist in determining the cause of the leak.

Oil Seals

Lubricant leaks from a oil seal may be caused by any of the following:

- An improperly installed seal
- A distorted seal
- A worn seal
- A worn shaft
- A brittle seal lip
- A hardened seal lip

To determine the actual cause of the leak, clean the area around the leak. Observe the area of the leak and determine if the seal or another component is causing the leak. A worn seal surface will cause a leak at the sealing lip while a misaligned seal or a seal installed into a housing with an excessive bore will cause the seal to leak at the outside surface of the seal. Hardened or cracked seal lips usually indicate the axle is operating beyond the normal temperature limits for the axle. A seal whose sealing surface has been nicked or cut may indicate that the shaft has a rough, burred, or gouged surface and will need to be inspected before the seal can be replaced.

Sealing Surfaces

Front axles components are assembled using specific sealers. A leak at a surface sealed with sealant is usually caused by a poor fit of the components but can also be caused by the use of the wrong sealant. When correcting a sealant leak, inspect each component for distortion and for nicks or gouges that may prohibit the sealant from sealing properly and when re-assembling the component, use the proper sealant.

Differential Carrier Assembly

Lubricant leaks at the differential carrier assembly can occur at the following locations:

- Drain Plug
- Fill Plug
- Vent tube

Drain and fill plug leaks are usually caused by a loose plug. A vent tube leak can be caused by a loose fitting vent hose or by a vent tube assembly whose interior shield is stuck in the upside down position. Inspect the vent plug's interior shield for unrestricted movement, repair or replace the plug as necessary. Drain or fill plug leaks can be repaired by either

tightening the plug or by using an approved sealer on the threads on the plug.

REPAIR INSTRUCTIONS

LUBRICANT LEVEL INSPECTION - FRONT DRIVE AXLE

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Make sure the vehicle is level.
3. Inspect the front axle for leaks. Repair as necessary.
4. Remove the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
5. Clean the area around the front axle fill plug.

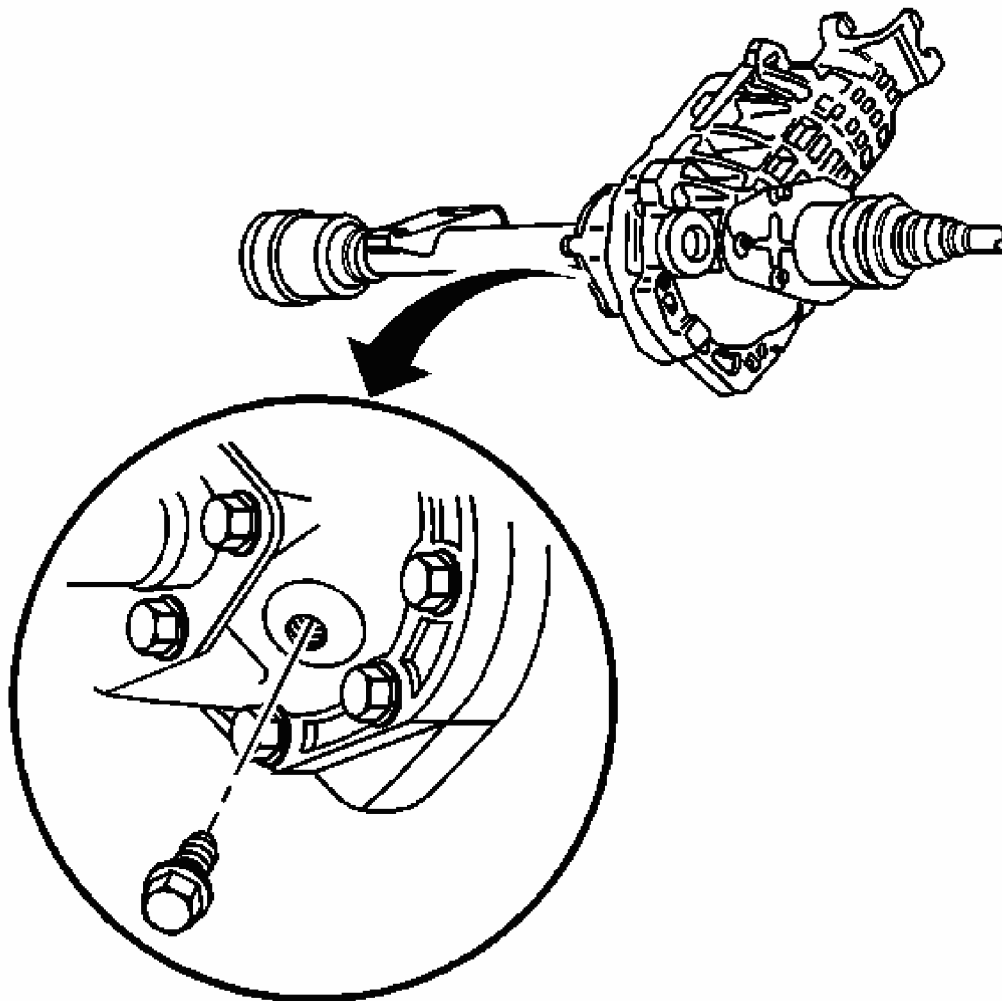


Fig. 26: Locating Front Axle Fill Plug & Washer

2004 Chevrolet S10 Pickup

2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

Courtesy of GENERAL MOTORS CORP.

6. Remove the front axle fill plug and the washer.
7. Inspect the oil level.

Specification: The oil level should be between 0-13 mm (0-0.5 in) below the fill plug opening.

8. If the level is low, add oil until the level is even with the bottom edge of the fill plug opening. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

NOTE: Refer to Fastener Notice in Cautions and Notices.

9. Install the fill plug and the washer.

Tighten: Tighten the plug to 33 N.m (24 lb ft).

10. Install the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
11. Lower the vehicle.

LUBRICANT REPLACEMENT - FRONT DRIVE AXLE

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the front differential carrier shield, if equipped. Refer to **Shield Replacement**.

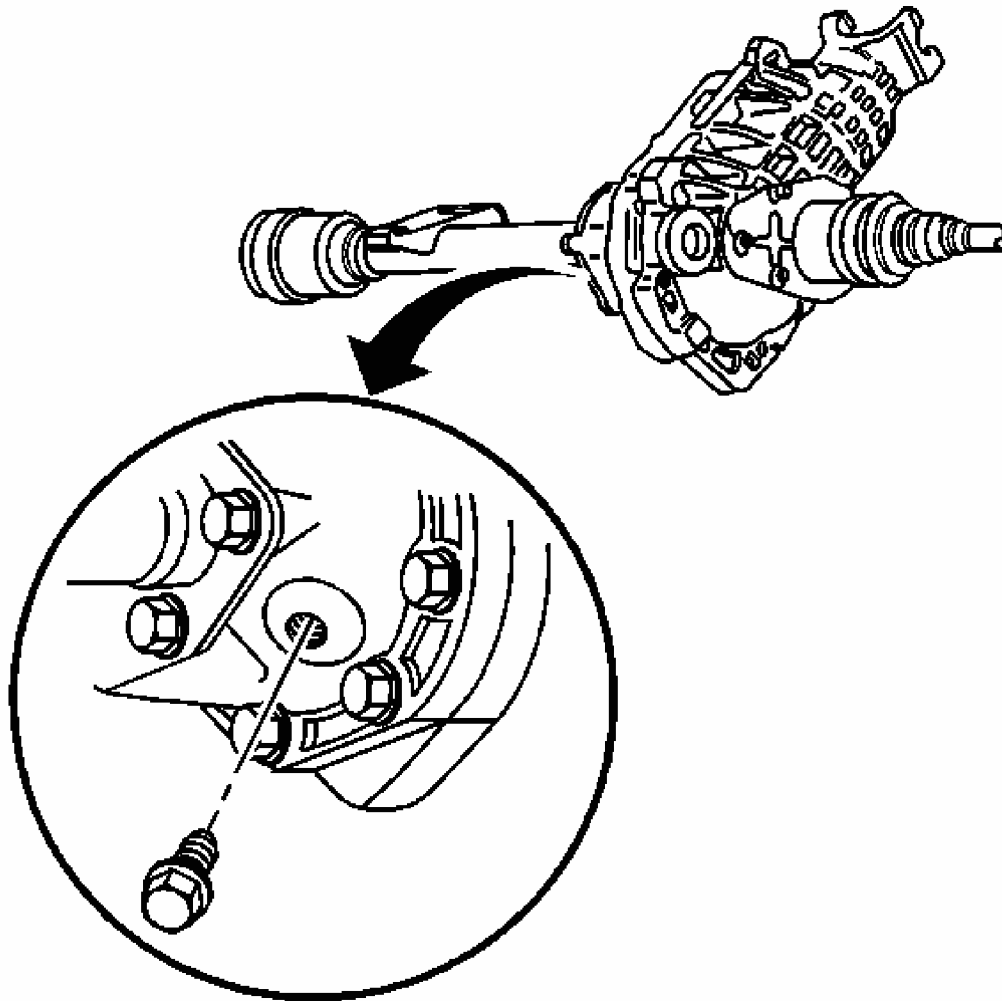


Fig. 27: Locating Front Axle Fill Plug & Washer
Courtesy of GENERAL MOTORS CORP.

3. Remove the fill plug and the washer.

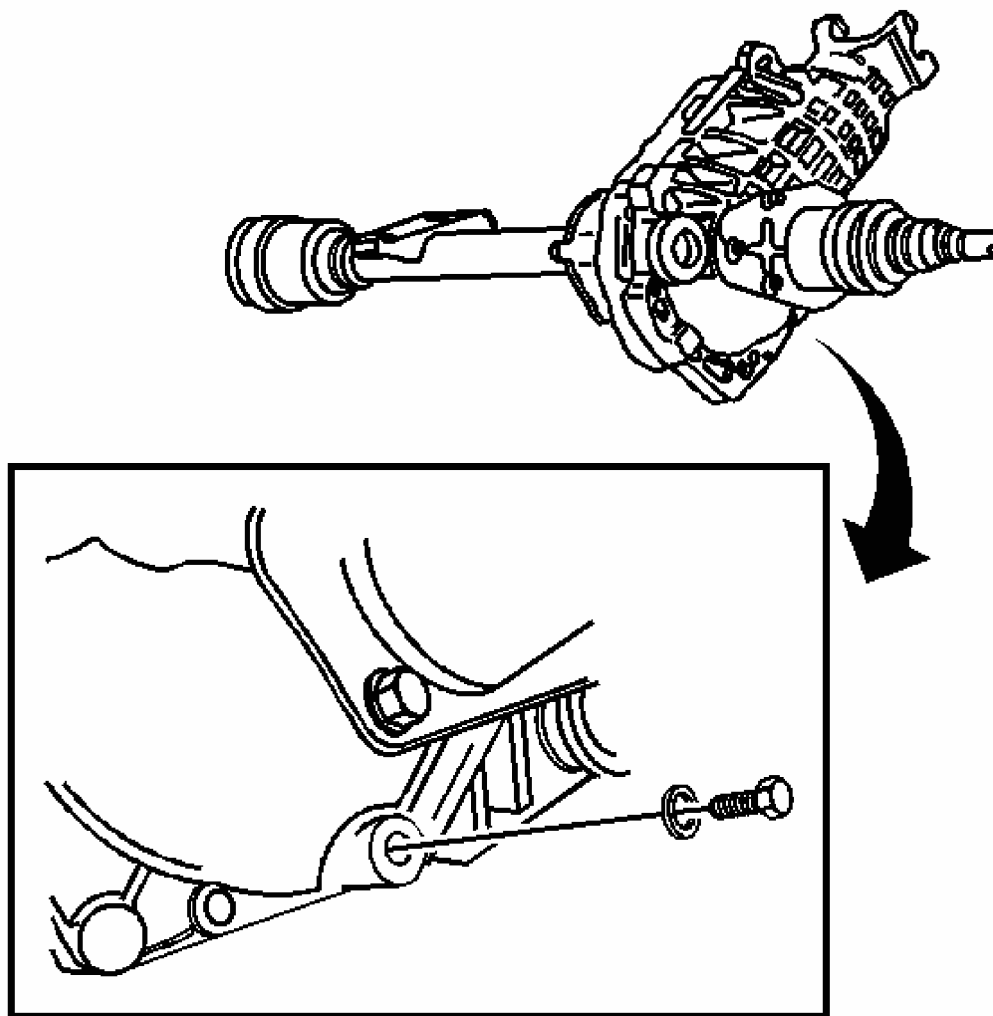


Fig. 28: Locating Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

4. Remove the drain plug and the washer.
5. Drain the fluid from the front axle differential.

Installation Procedure

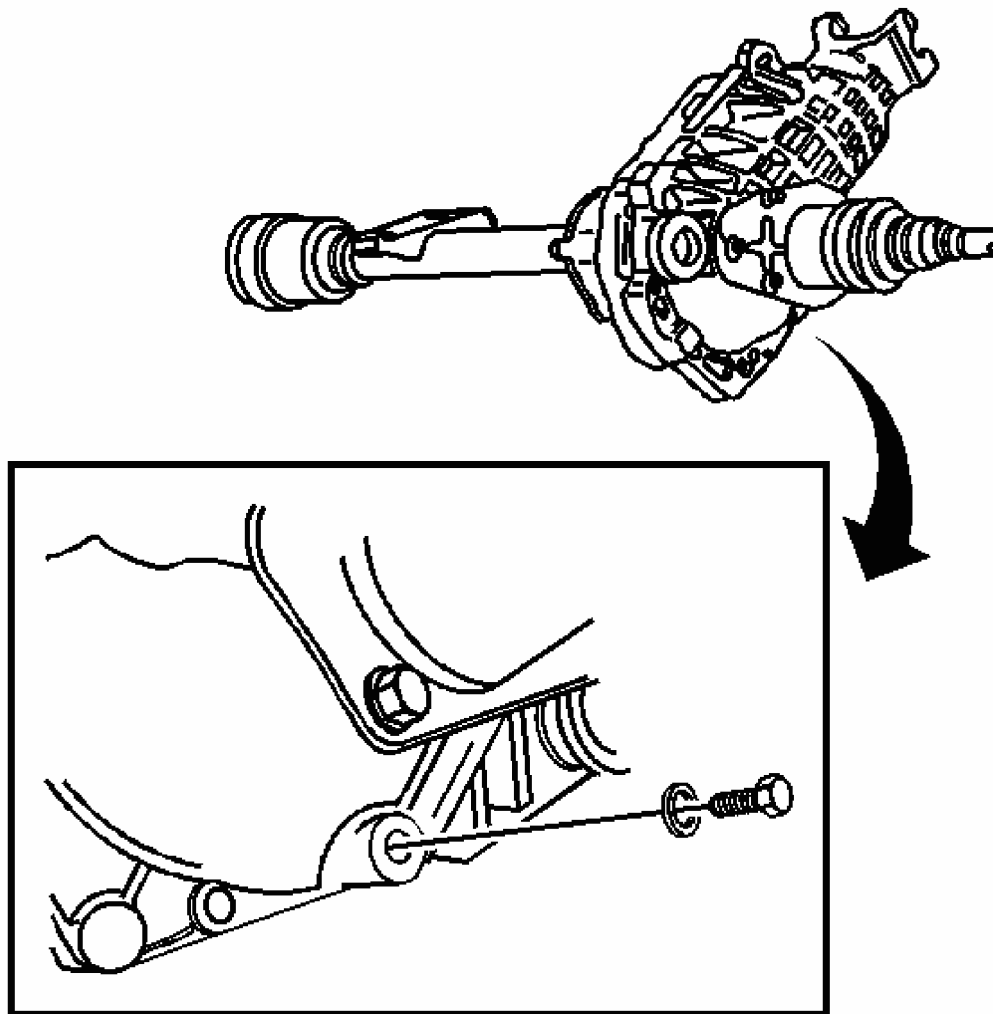


Fig. 29: Locating Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the drain plug and the washer.

Tighten: Tighten the drain plug to 33 N.m (24 lb ft).

2. Fill the front differential with lubricant. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

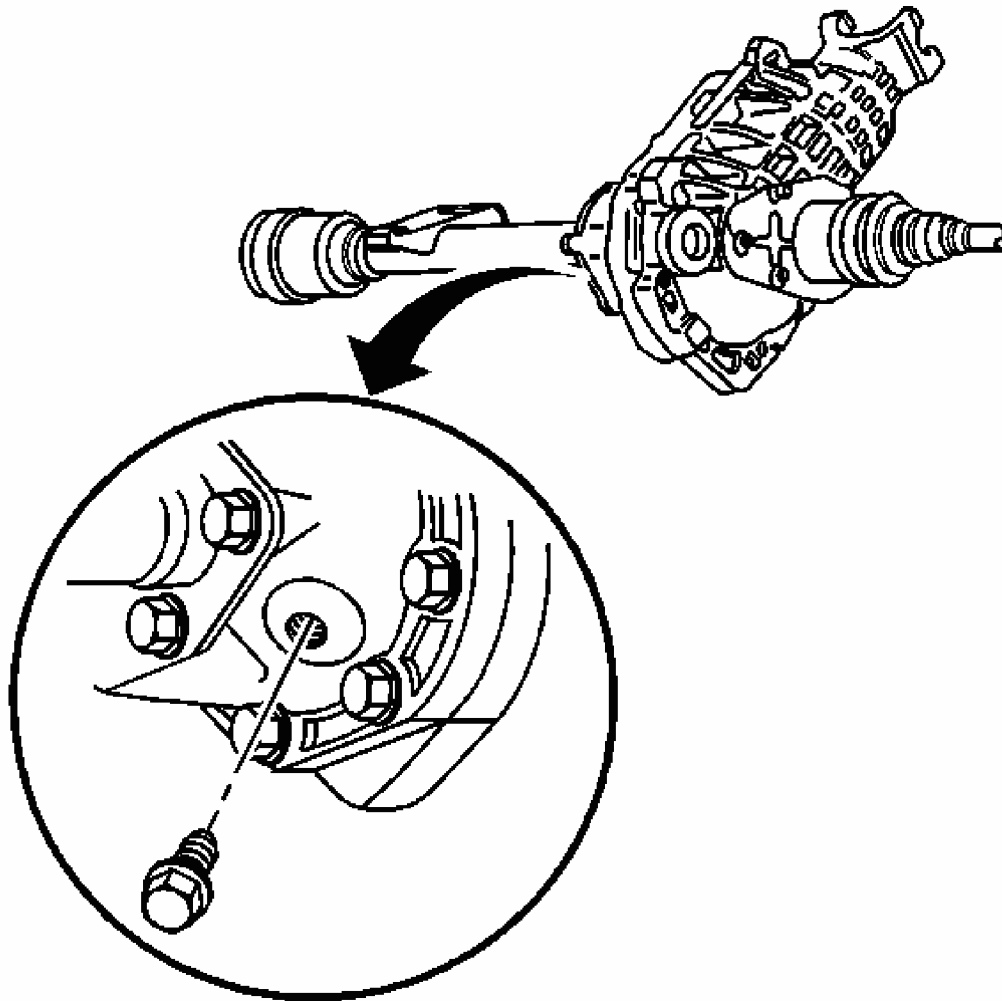


Fig. 30: Locating Front Axle Fill Plug & Washer
Courtesy of GENERAL MOTORS CORP.

3. Install the fill plug and the washer.

Tighten: Tighten the fill plug to 33 N.m (24 lb ft).

4. Install the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
5. Lower the vehicle.

SHIELD REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

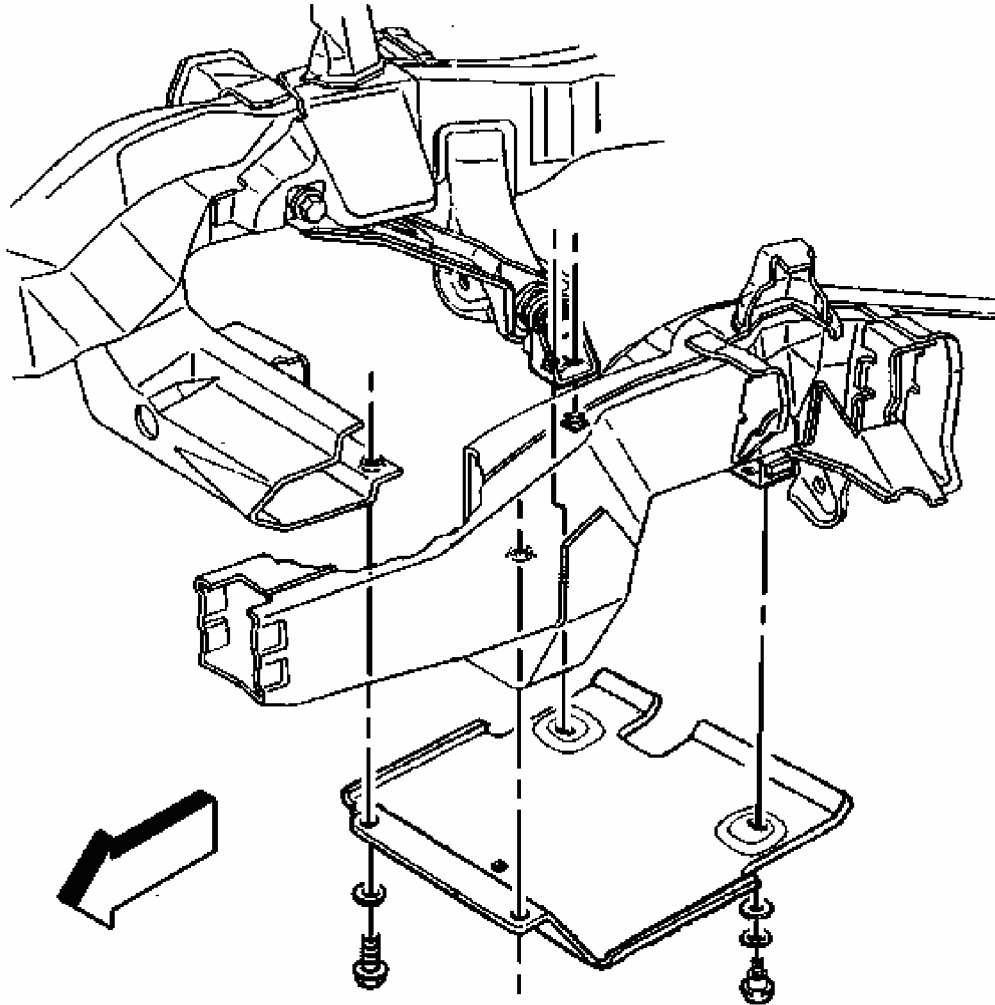


Fig. 31: View Of Front Differential Carrier Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the front differential carrier shield bolts and washers.
3. Remove the front differential carrier shield.

Installation Procedure

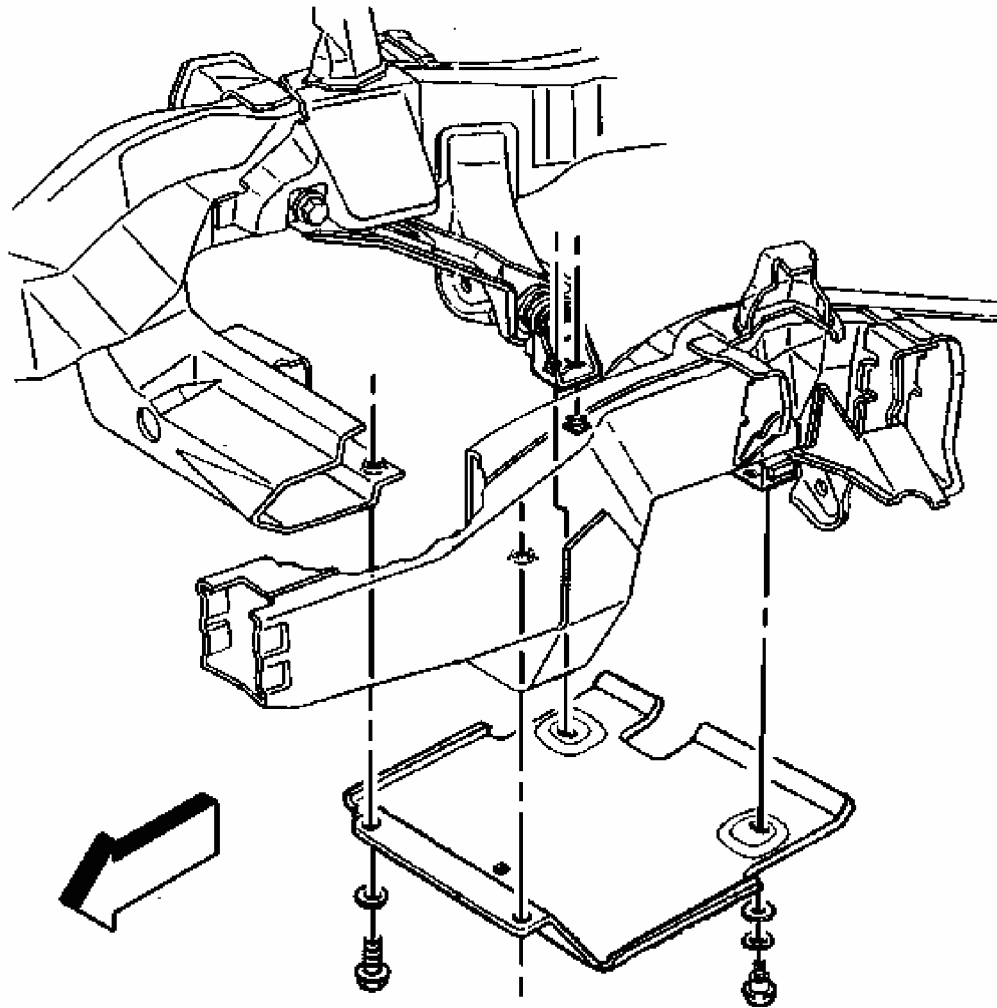


Fig. 32: View Of Front Differential Carrier Shield
Courtesy of GENERAL MOTORS CORP.

1. Install the front differential carrier shield.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the front differential carrier shield bolts and the washers.

Tighten: Tighten the front differential carrier shield bolts to 25 N.m (18 lb ft).

3. Lower the vehicle.

FOUR-WHEEL DRIVE INDICATOR SWITCH REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the front differential carrier shield, if equipped. Refer to **Shield Replacement**.

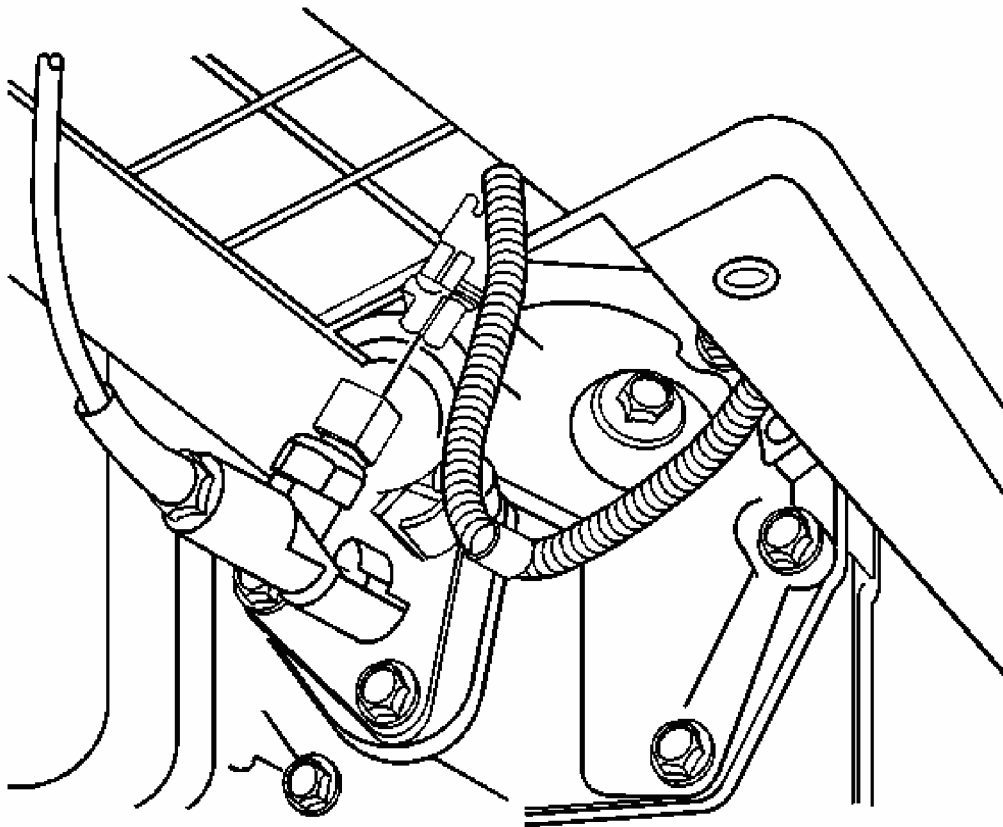


Fig. 33: View Of Four-Wheel Drive Indicator Switch Electrical Harness
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical harness from the four-wheel drive indicator switch.

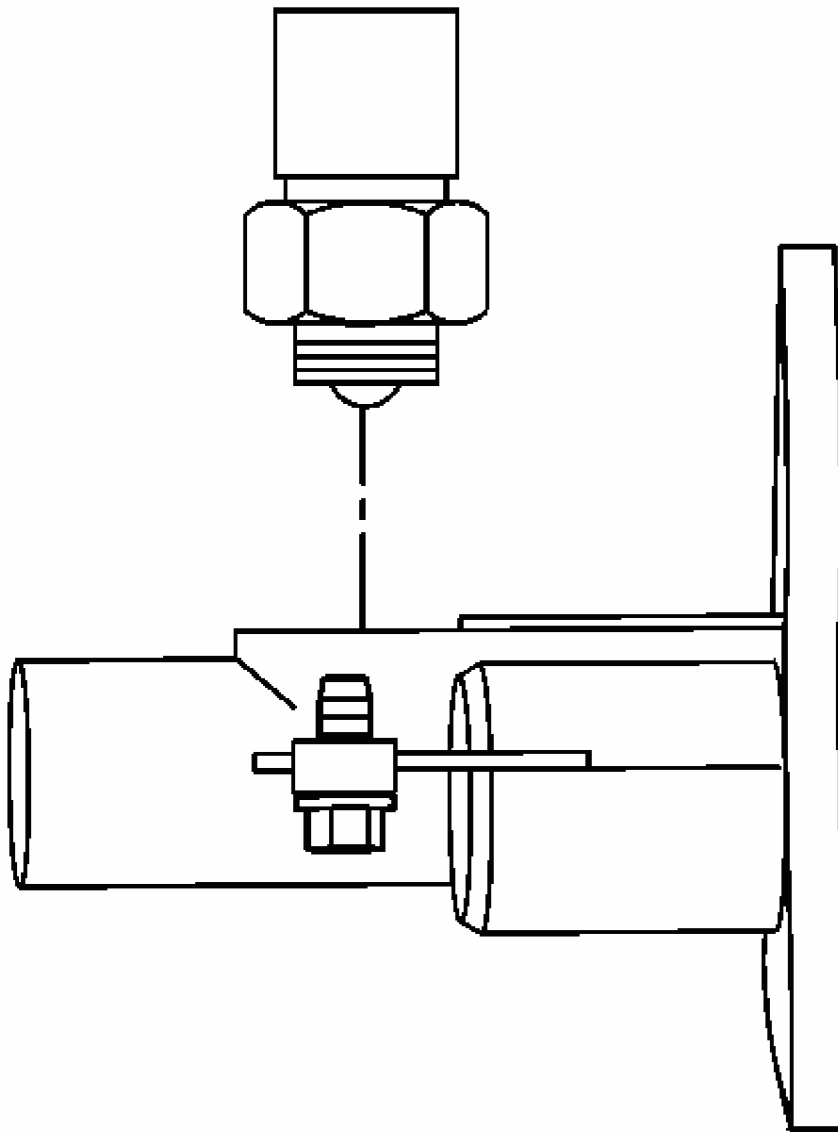


Fig. 34: View Of Four-Wheel Drive Indicator Switch
Courtesy of GENERAL MOTORS CORP.

4. Remove the four-wheel drive indicator switch.

Installation Procedure

2004 Chevrolet S10 Pickup

2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

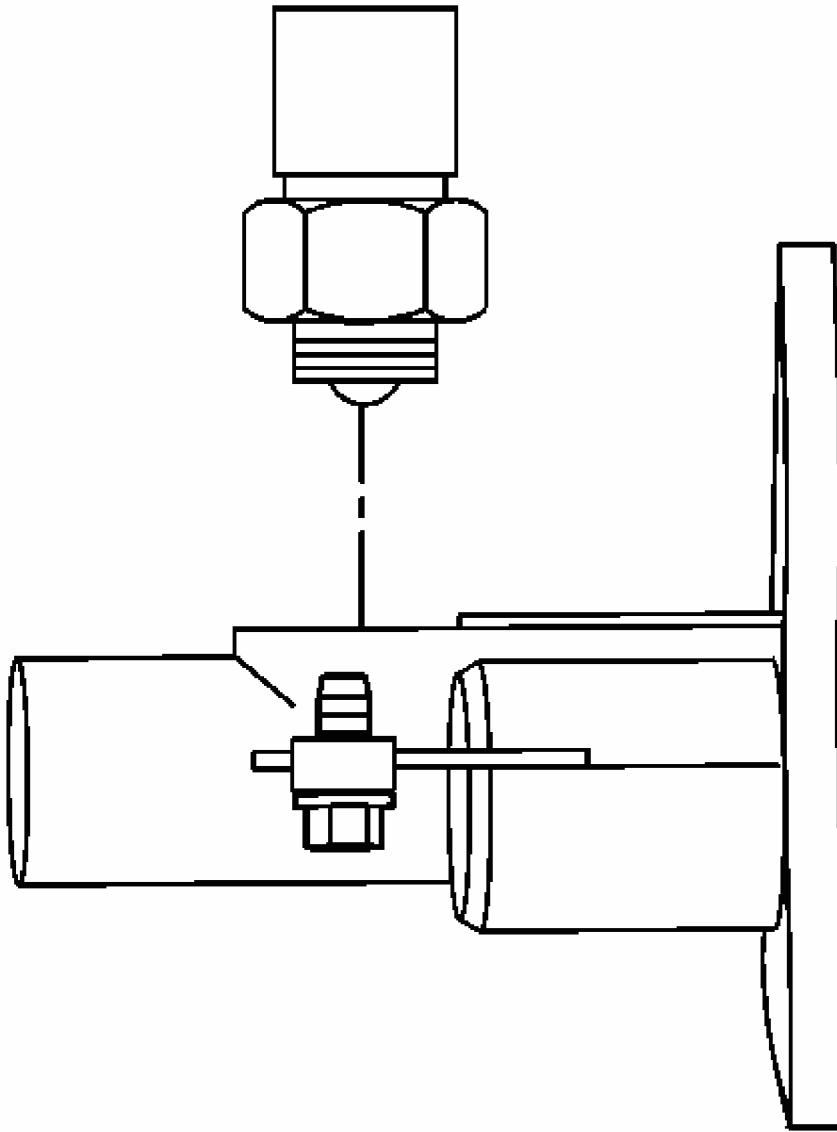


Fig. 35: View Of Four-Wheel Drive Indicator Switch
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the four-wheel drive indicator switch.

Tighten: Tighten the four-wheel drive indicator switch to 5 N.m (44 lb in).

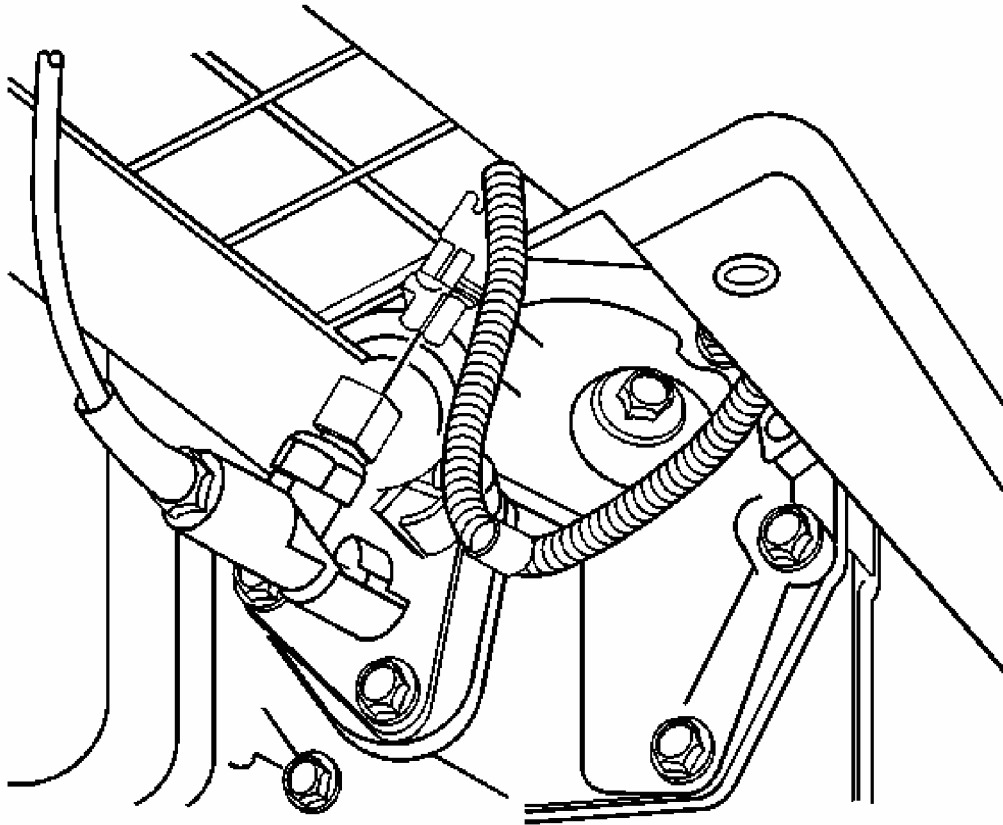


Fig. 36: View Of Four-Wheel Drive Indicator Switch Electrical Harness
Courtesy of GENERAL MOTORS CORP.

2. Install the electrical harness from the four-wheel drive indicator switch.
3. Install the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
4. Lower the vehicle.

VACUUM ACTUATOR SOLENOID VALVE REPLACEMENT

Removal Procedure

1. Open the hood.

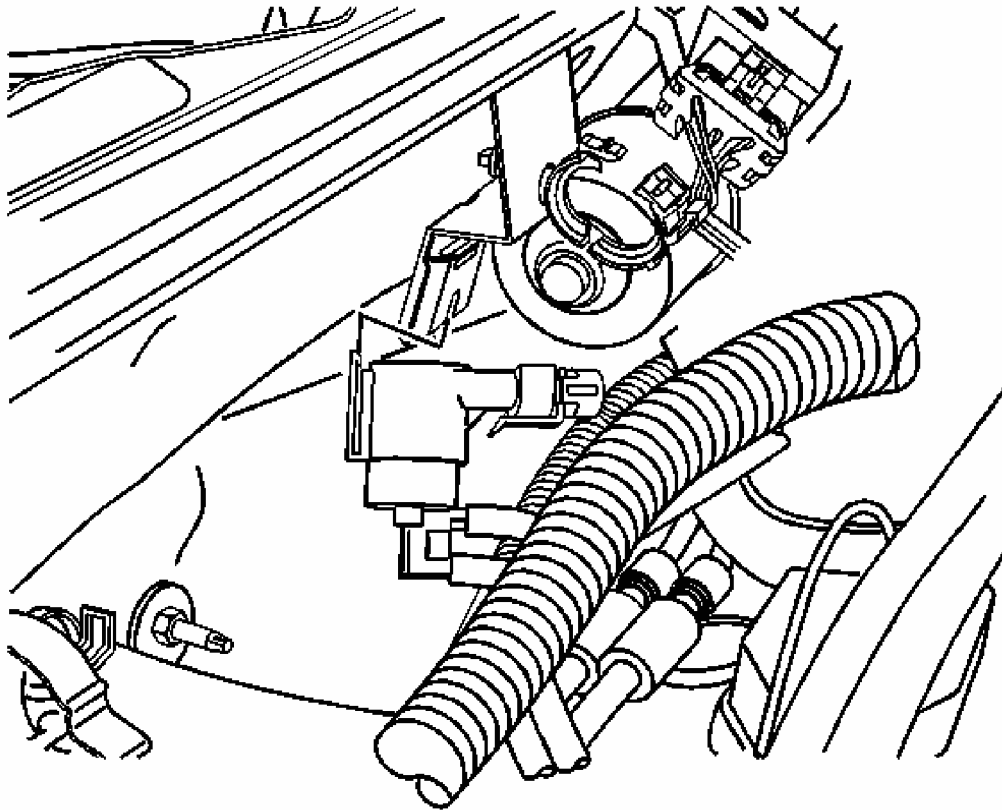


Fig. 37: View Of Vacuum Solenoid Valve
Courtesy of GENERAL MOTORS CORP.

2. Remove the vacuum solenoid valve from the vacuum solenoid valve bracket.

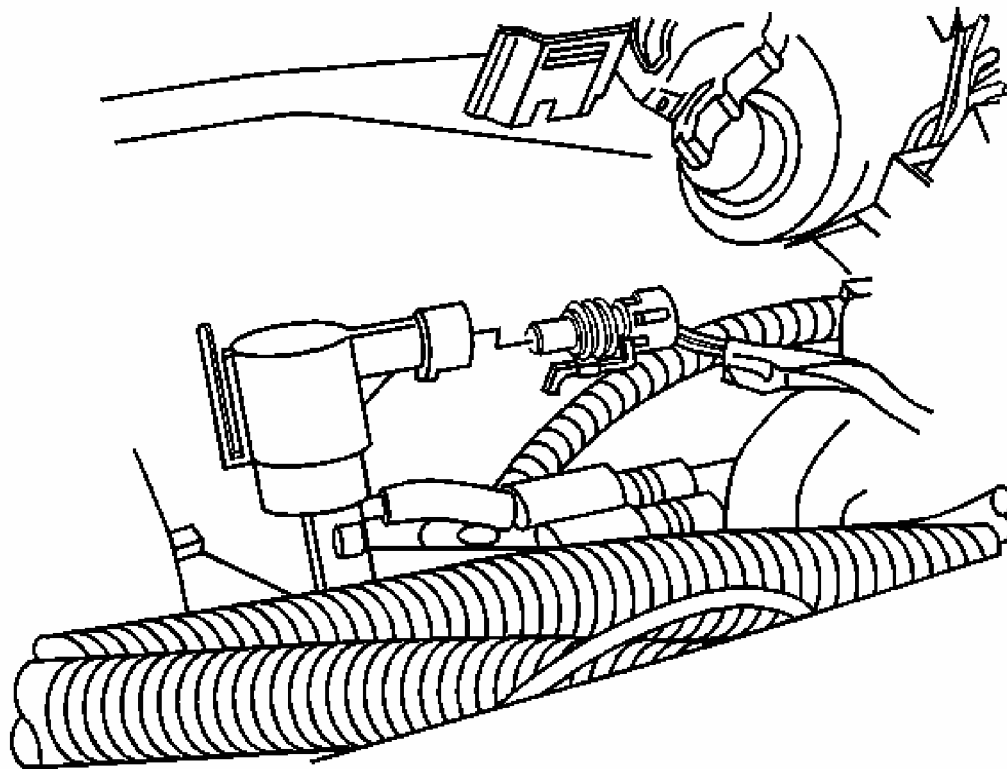


Fig. 38: Locating Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connector from the vacuum solenoid valve.

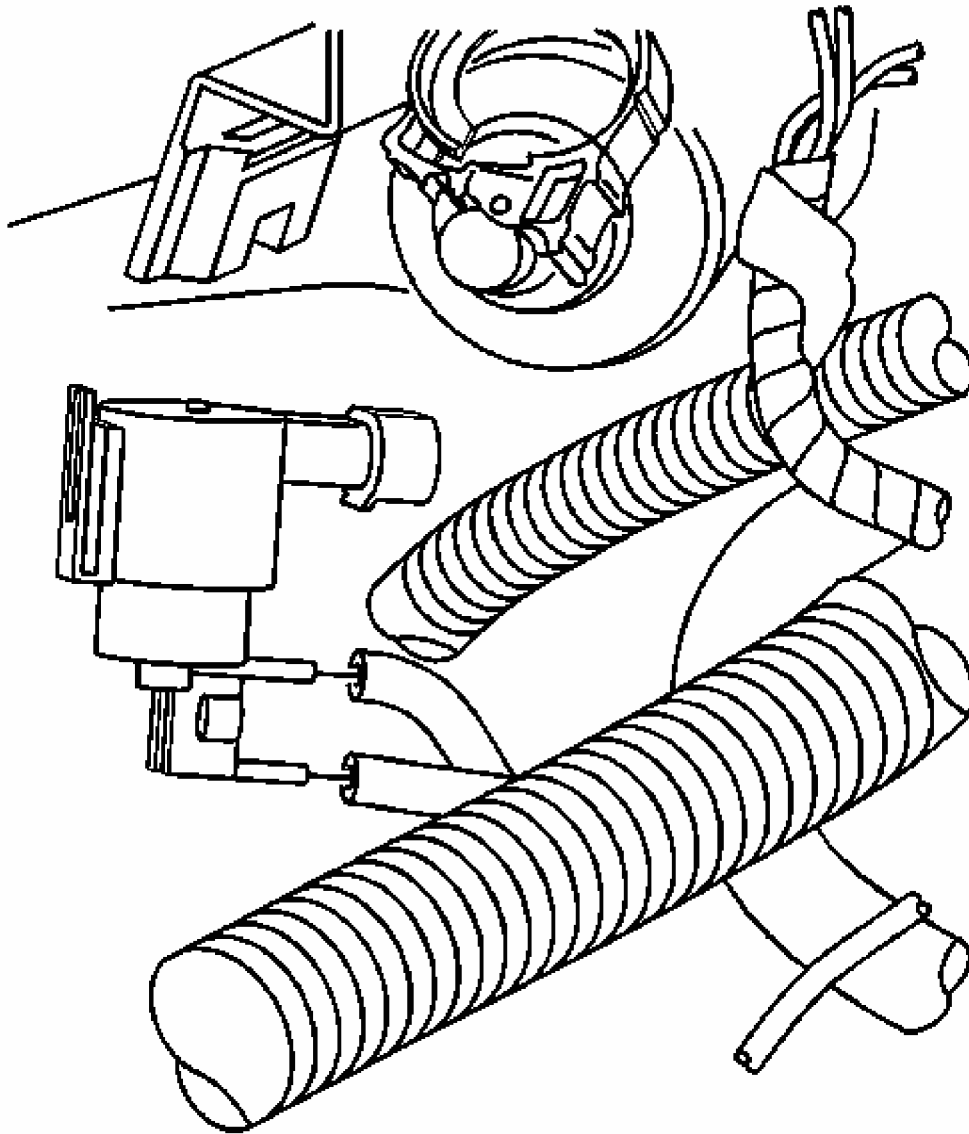


Fig. 39: Locating Vacuum Hoses At Vacuum Solenoid Valve
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the vacuum hoses from the vacuum solenoid valve.
5. Remove the vacuum solenoid valve.

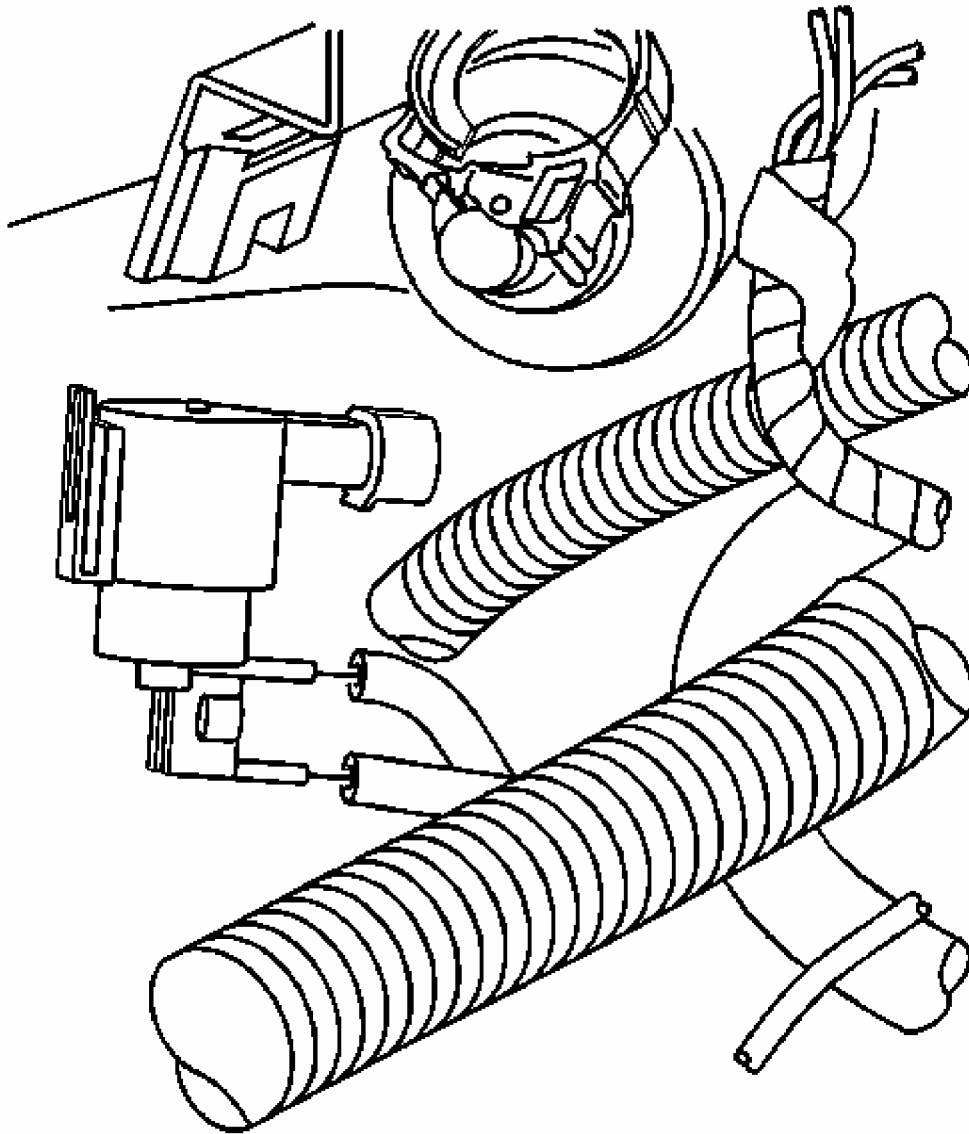


Fig. 40: Locating Vacuum Hoses At Vacuum Solenoid Valve
Courtesy of GENERAL MOTORS CORP.

1. Connect the vacuum hoses to the vacuum solenoid valve.

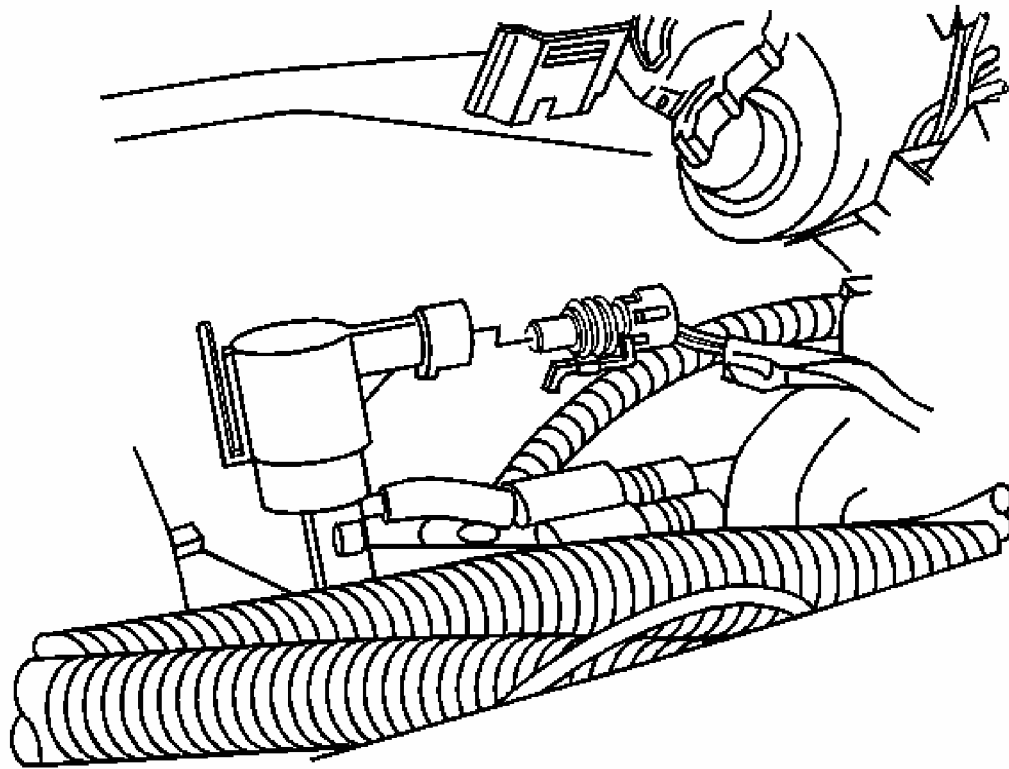


Fig. 41: Locating Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Connect the electrical connector to the vacuum solenoid valve.

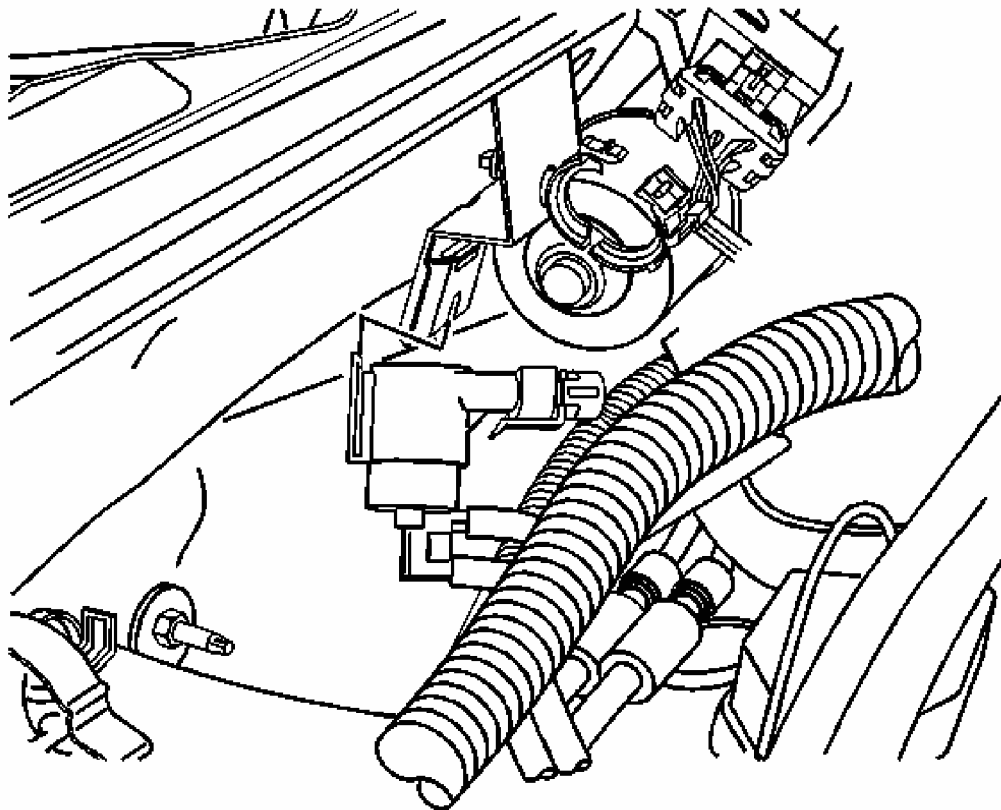


Fig. 42: View Of Vacuum Solenoid Valve
Courtesy of GENERAL MOTORS CORP.

3. Install the vacuum solenoid valve to the vacuum solenoid valve bracket.
4. Close the hood.

VENT HOSE REPLACEMENT

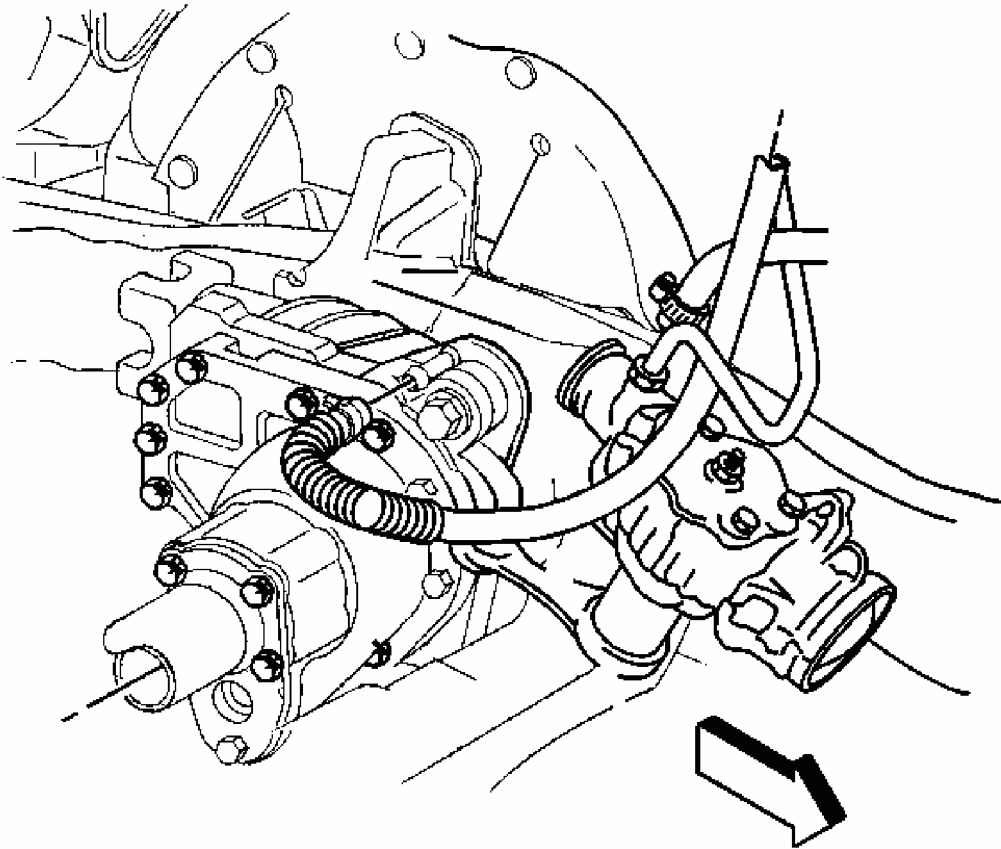


Fig. 43: Locating Vent Hose
Courtesy of GENERAL MOTORS CORP.

When replacing the hose, ensure that the hose is routed correctly, free of kinks, and clear of sharp components. Ensure the vent is not plugged.

CLUTCH CABLE REPLACEMENT - FRONT DRIVE AXLE

Removal Procedure

1. Remove the battery and the battery tray. Refer to **Battery Tray Replacement** in Engine Electrical.

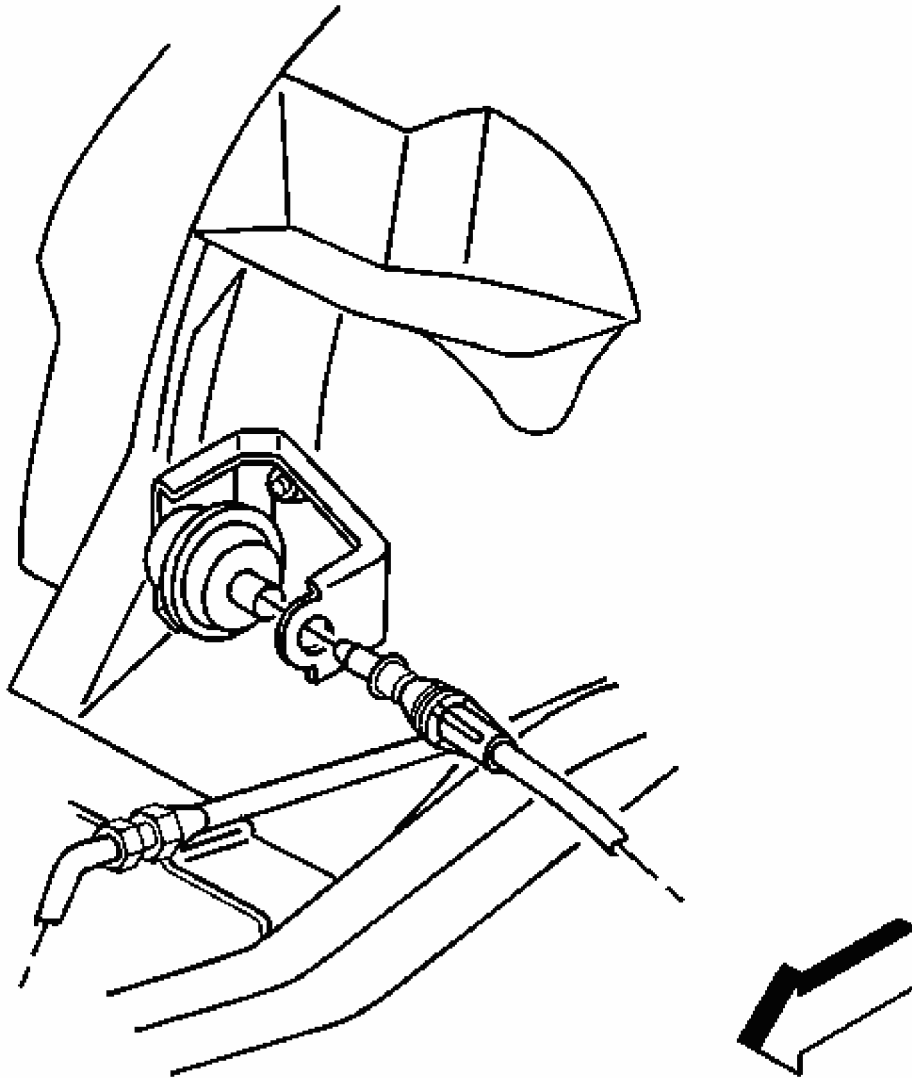


Fig. 44: View Of Clutch Cable
Courtesy of GENERAL MOTORS CORP.

2. Remove the clutch cable hold down bolt attached to frame.
3. Disconnect the clutch cable from the retainer spring clip on the vacuum actuator.
4. Disconnect the clutch cable from the vacuum actuator bracket.
5. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
6. Remove the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
7. Cut the strap holding the wire harness and the clutch cable together.

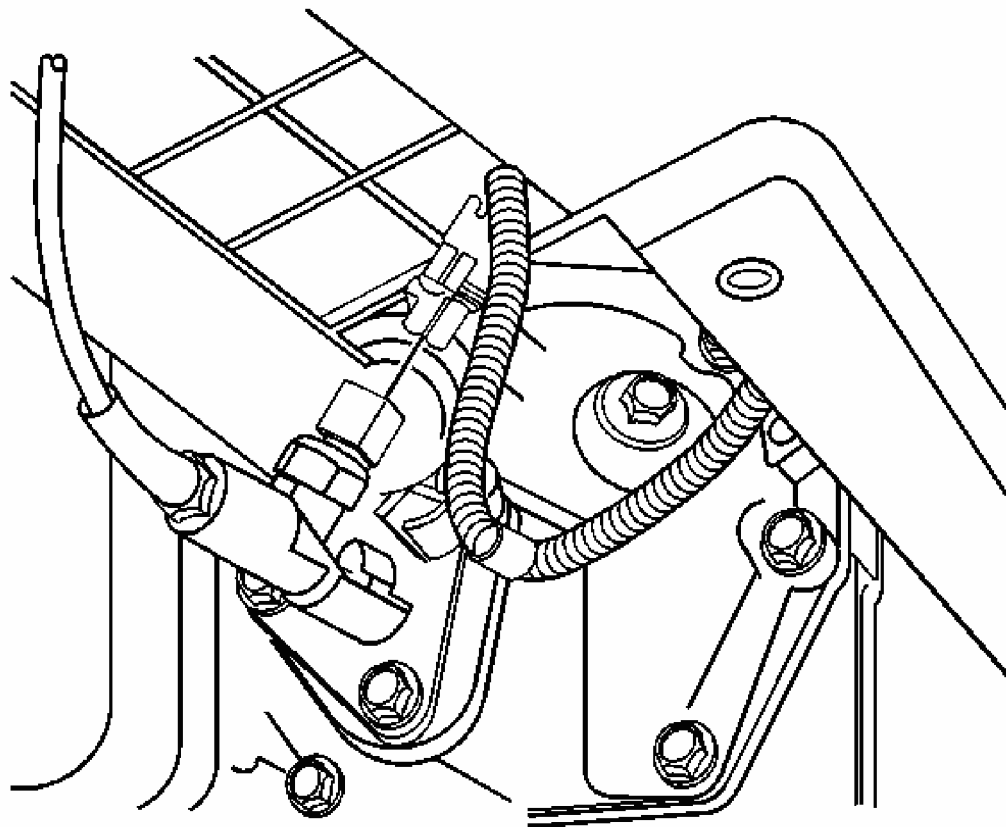


Fig. 45: View Of Four-Wheel Drive Indicator Switch Electrical Harness
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the electrical connector from the four-wheel drive indicator switch.

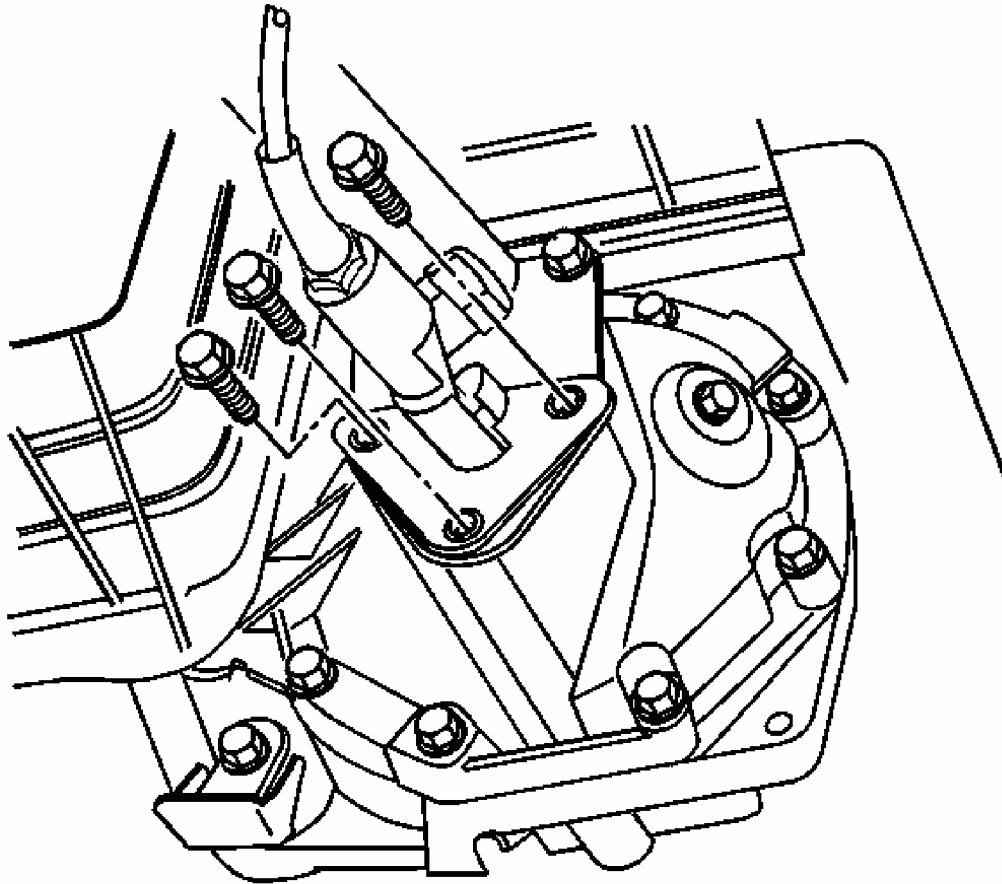


Fig. 46: Locating Clutch Cable Housing Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the three bolts from the clutch cable housing.

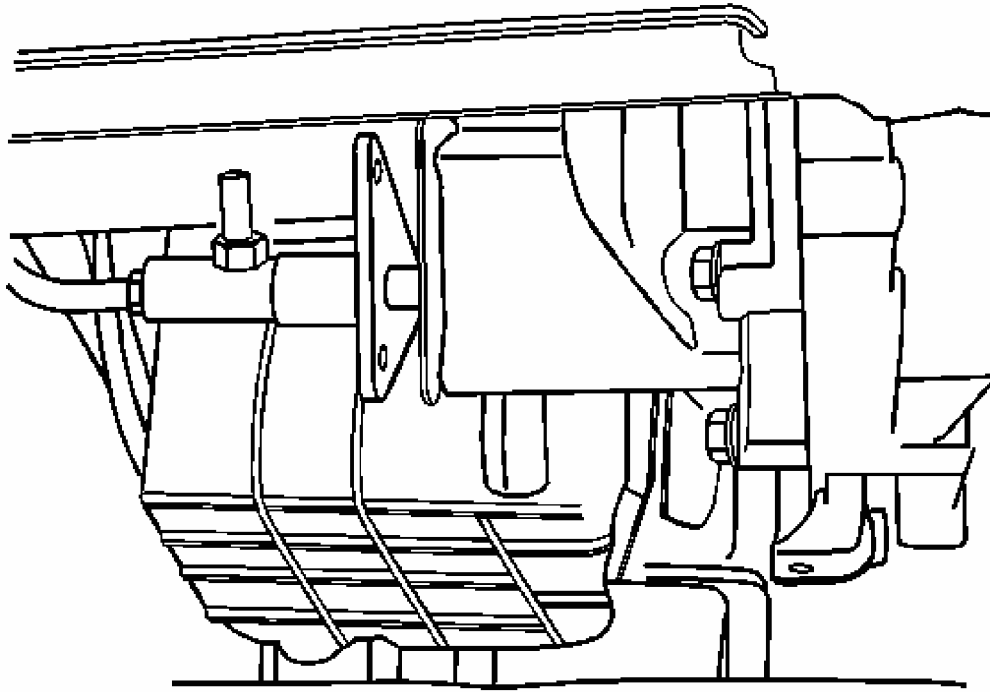


Fig. 47: View Of Clutch Cable Housing
Courtesy of GENERAL MOTORS CORP.

10. Separate the clutch cable housing from the differential carrier assembly.

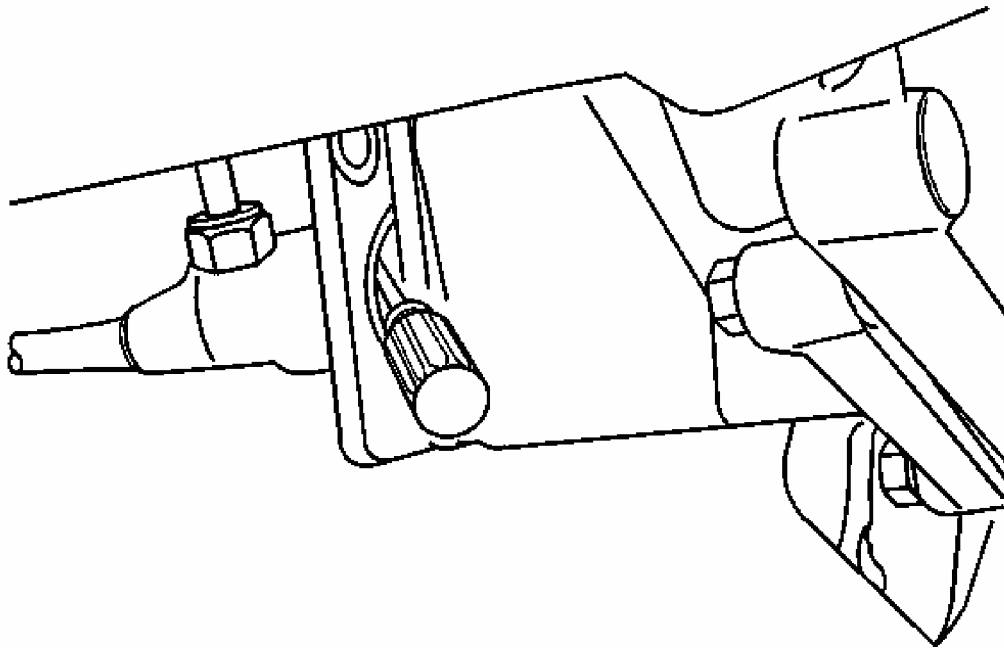


Fig. 48: Disconnecting Clutch Cable Retainer Spring Using Screwdriver
Courtesy of GENERAL MOTORS CORP.

11. Insert a screwdriver, or similar tool, into the clutch cable housing opening and disconnect the retainer spring from the clutch cable.

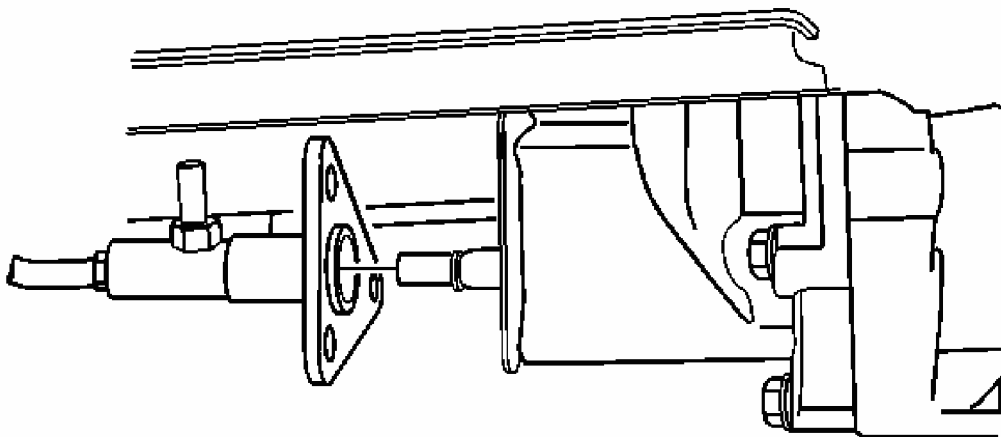


Fig. 49: View Of Clutch Cable Housing
Courtesy of GENERAL MOTORS CORP.

12. Remove the clutch cable and the clutch cable housing from the differential carrier assembly.

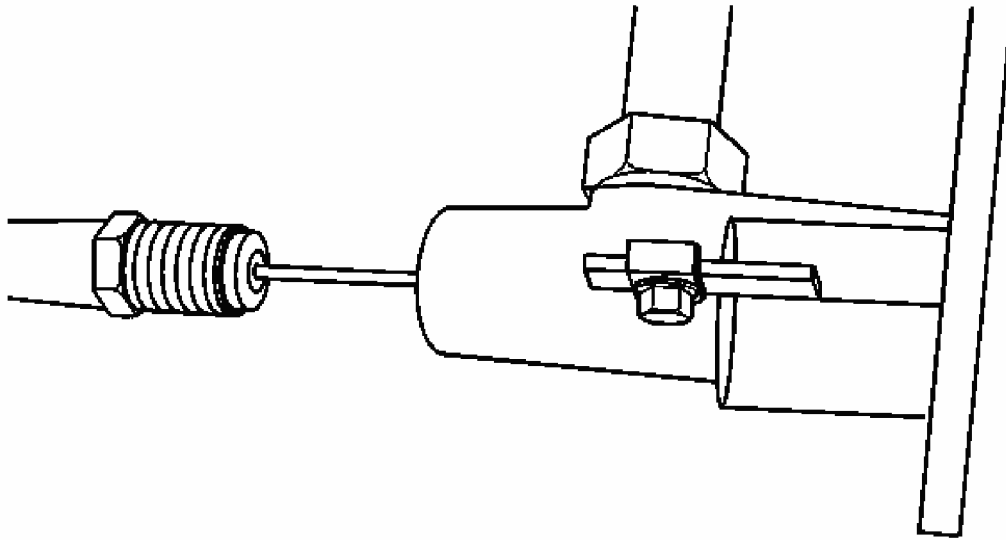


Fig. 50: Locating Clutch Cable Coupling Nut
Courtesy of GENERAL MOTORS CORP.

13. Disconnect the clutch cable coupling nut from the clutch cable housing.
14. Remove the clutch cable.

Installation Procedure

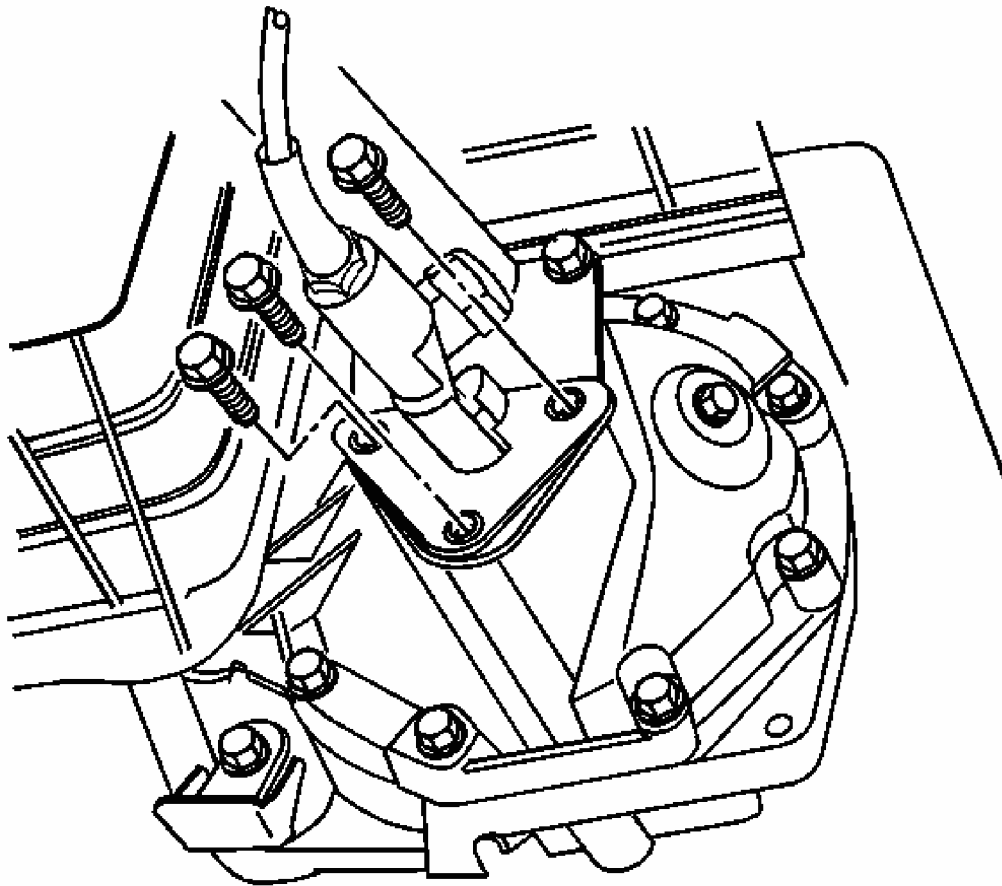


Fig. 51: Locating Clutch Cable Housing Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the clutch cable housing.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the clutch cable housing bolts.

Tighten: Tighten the clutch cable housing bolts to 48 N.m (36 lb ft).

3. Insert the clutch cable into the clutch fork.

Engage the spring retainer in order to retain the clutch cable.

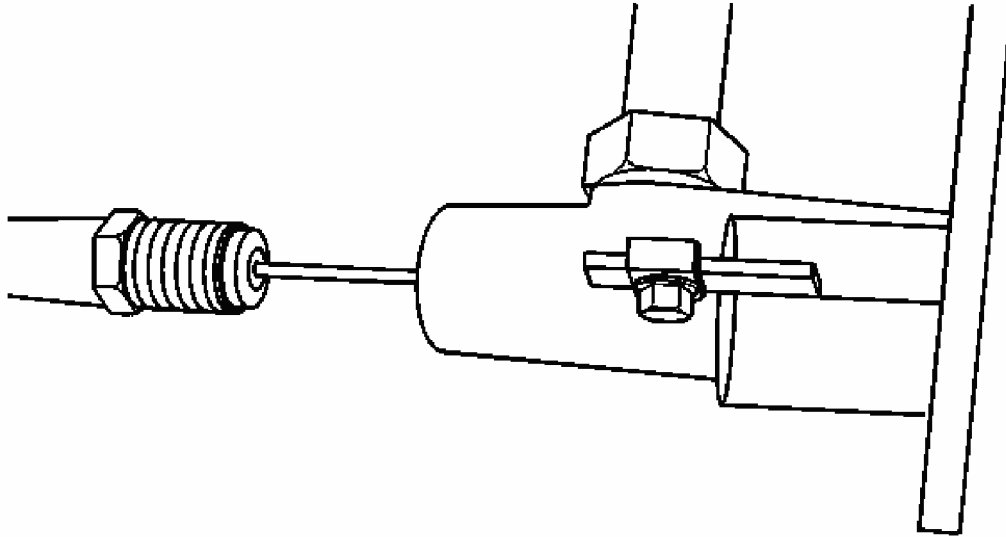


Fig. 52: Locating Clutch Cable Coupling Nut
Courtesy of GENERAL MOTORS CORP.

4. Install the clutch cable coupling nut to the clutch cable housing.

Tighten: Tighten the clutch cable coupling nut to 10 N.m (89 lb in).

5. Route the clutch cable to the vacuum actuator.
6. Connect the electrical connector to the four-wheel drive indicator switch.
7. Install the front differential carrier shield, if equipped. Refer to **Shield Replacement**.
8. Lower the vehicle.
9. Install the clutch cable hold down bolt.

Tighten: Tighten the cable hold down bolt to 17 N.m (13 lb ft).

10. Tie the cable and wire harness together with a tie strap.

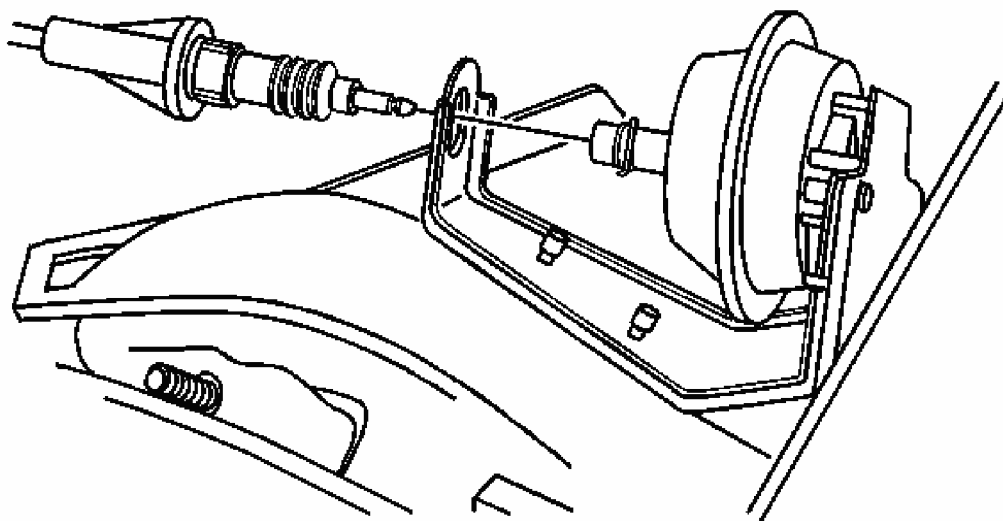


Fig. 53: View Of Clutch Cable To Vacuum Actuator Bracket
Courtesy of GENERAL MOTORS CORP.

11. Install the clutch cable to the vacuum actuator bracket.

The clutch cable must engage the retainer spring on the vacuum actuator.

The clutch cable lock tabs must engage the vacuum actuator bracket.

12. Install the battery and the battery tray. Refer to **Battery Tray Replacement** in Engine Electrical.

CLUTCH CABLE HOUSING REPLACEMENT - FRONT DRIVE AXLE

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the front differential carrier shield, if equipped. Refer to **Shield Replacement**.

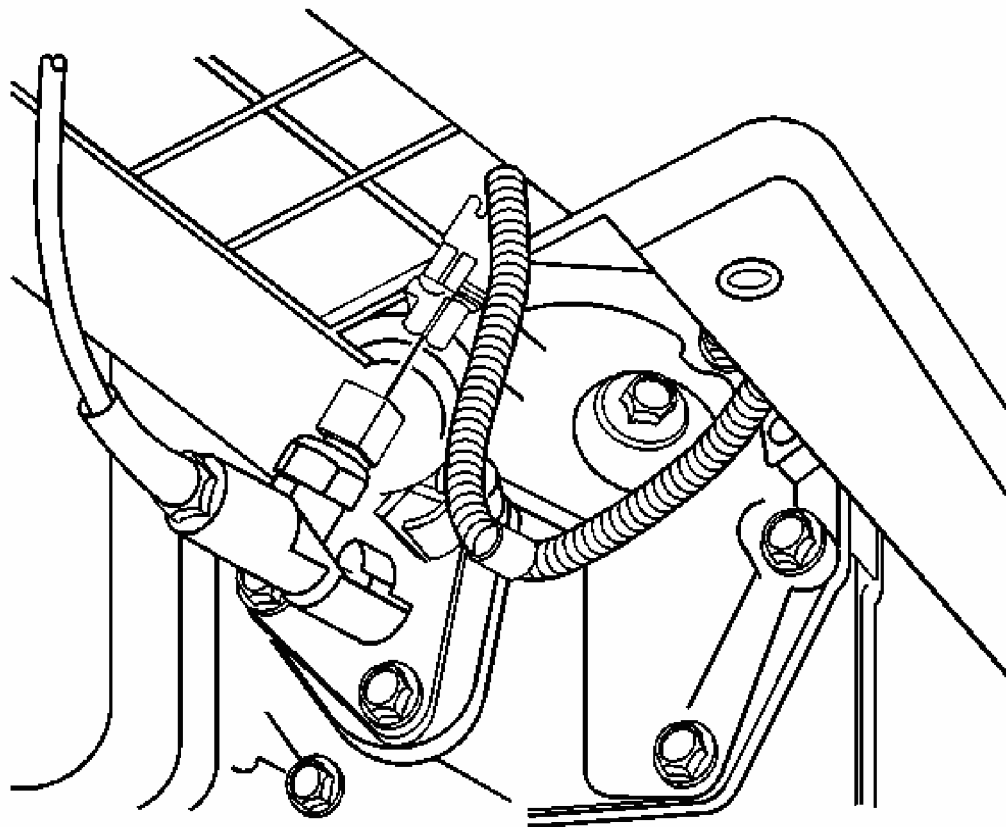


Fig. 54: View Of Four-Wheel Drive Indicator Switch Electrical Harness
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connector from the four-wheel drive indicator switch.

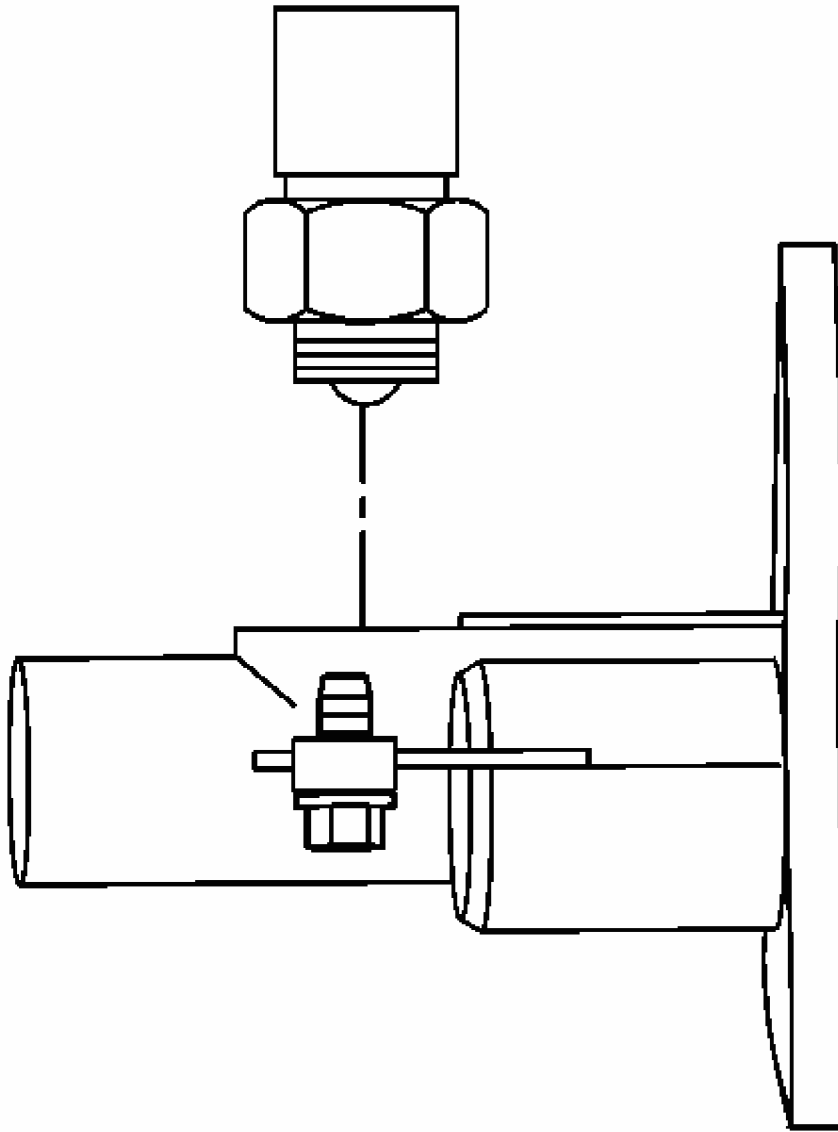


Fig. 55: View Of Four-Wheel Drive Indicator Switch
Courtesy of GENERAL MOTORS CORP.

4. Remove the four-wheel drive indicator switch.

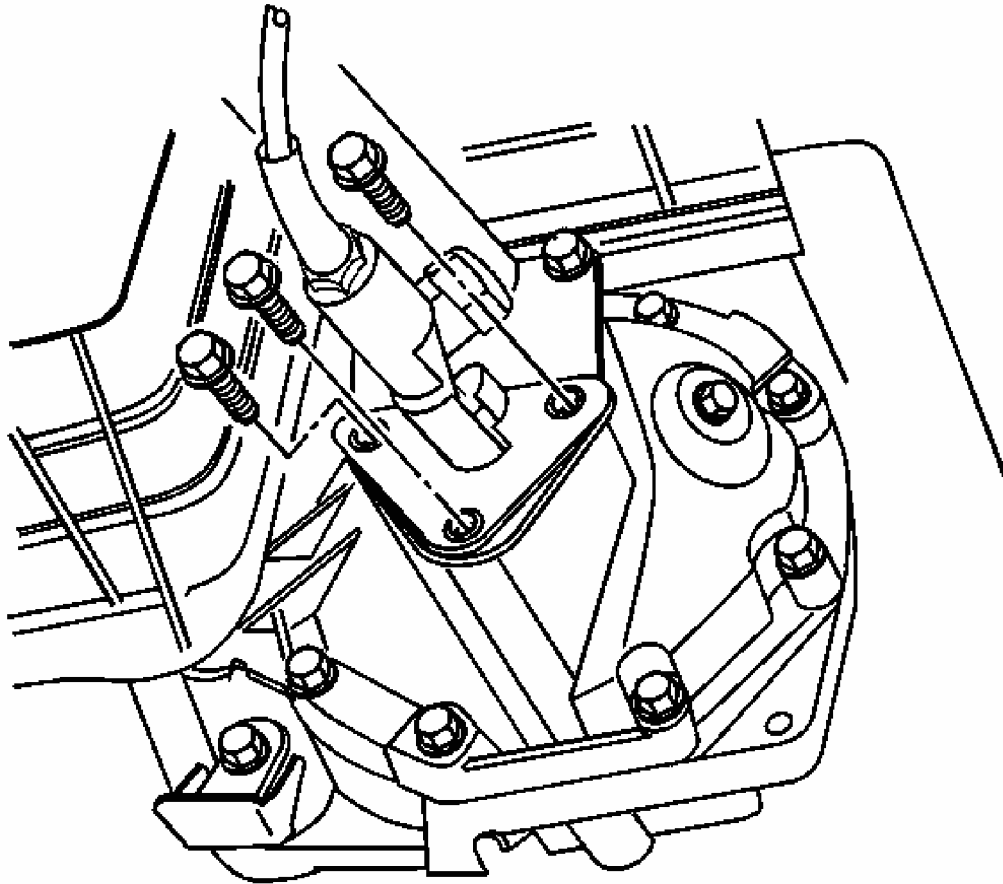


Fig. 56: Locating Clutch Cable Housing Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the 3 bolts from the clutch cable housing.

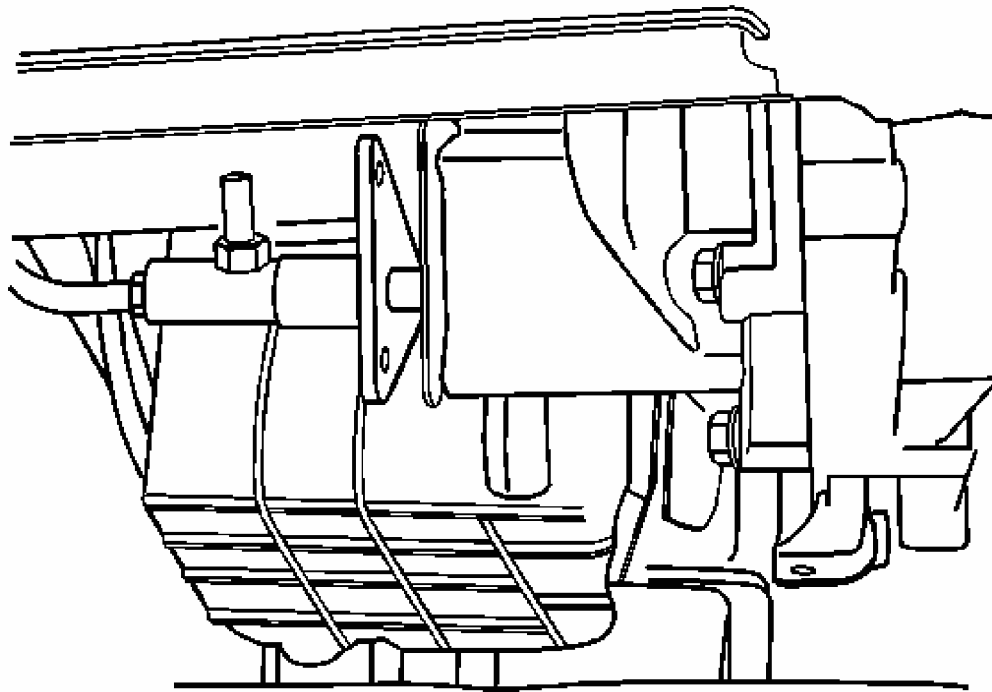


Fig. 57: View Of Clutch Cable Housing
Courtesy of GENERAL MOTORS CORP.

6. Separate the clutch cable housing from the differential carrier assembly.

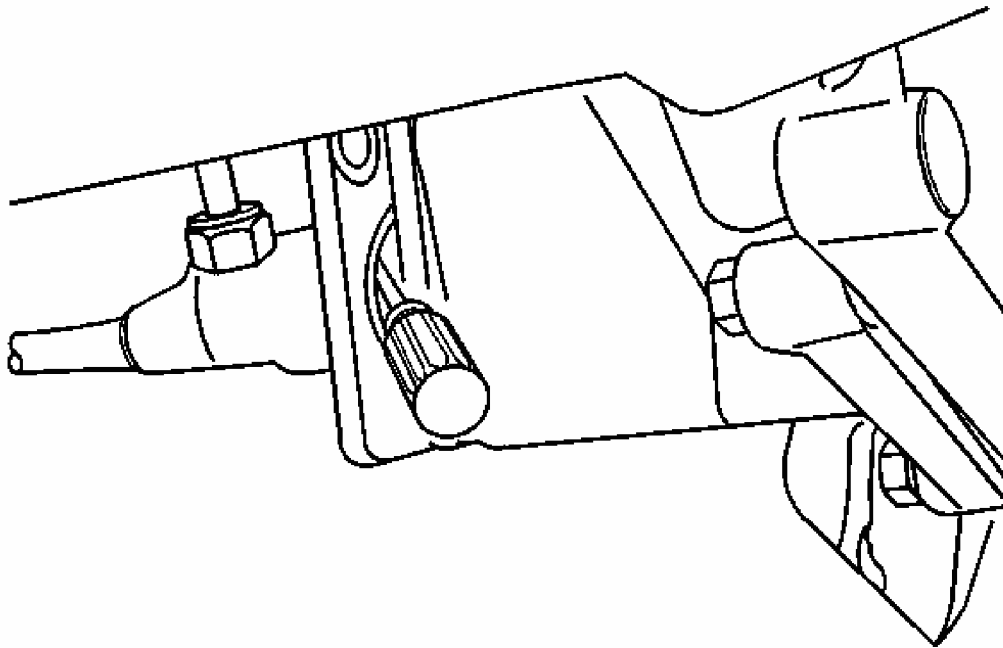


Fig. 58: Disconnecting Clutch Cable Retainer Spring Using Screwdriver
Courtesy of GENERAL MOTORS CORP.

7. Insert a screwdriver, or similar tool, into the clutch cable housing opening and disconnect the retainer spring from the clutch cable.

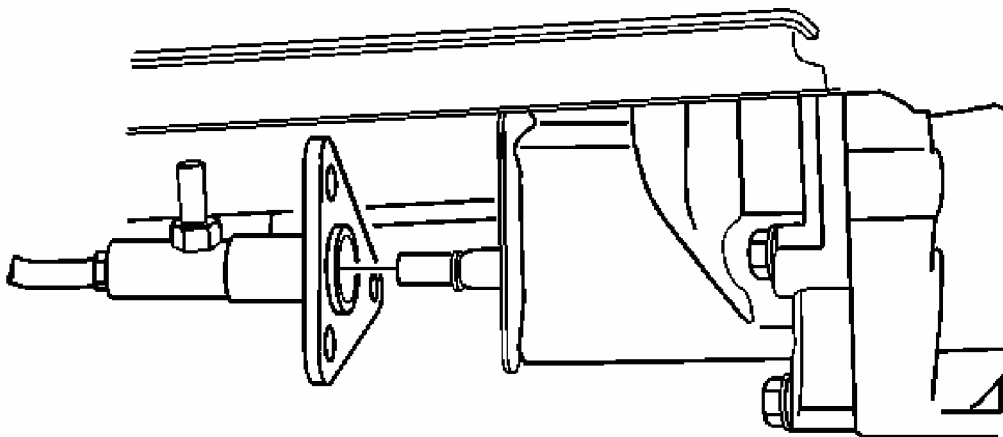


Fig. 59: View Of Clutch Cable Housing
Courtesy of GENERAL MOTORS CORP.

8. Remove the clutch cable and the clutch cable housing from the differential carrier assembly.

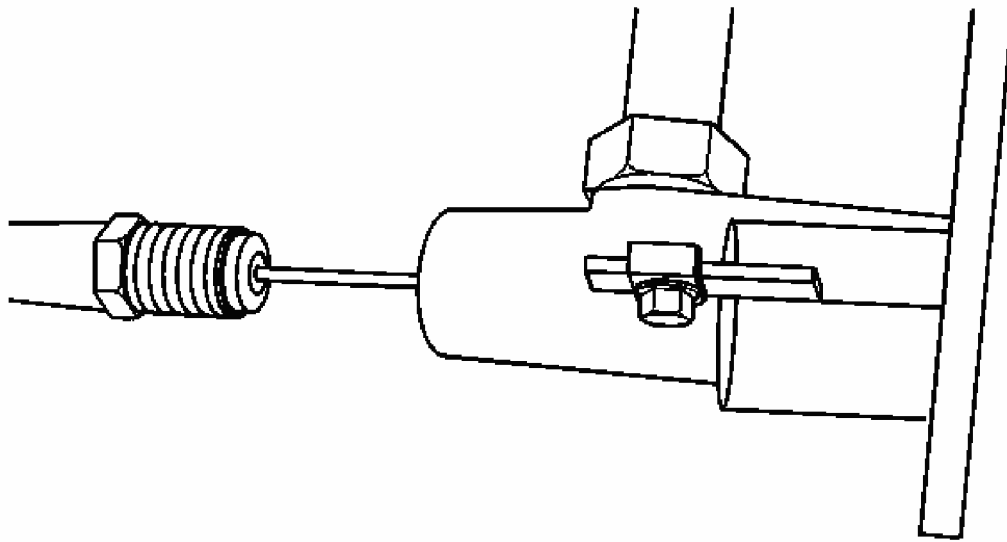


Fig. 60: Locating Clutch Cable Coupling Nut
Courtesy of GENERAL MOTORS CORP.

9. Disconnect the clutch cable coupling nut from the clutch cable housing.
10. Remove the clutch cable housing.

Installation Procedure

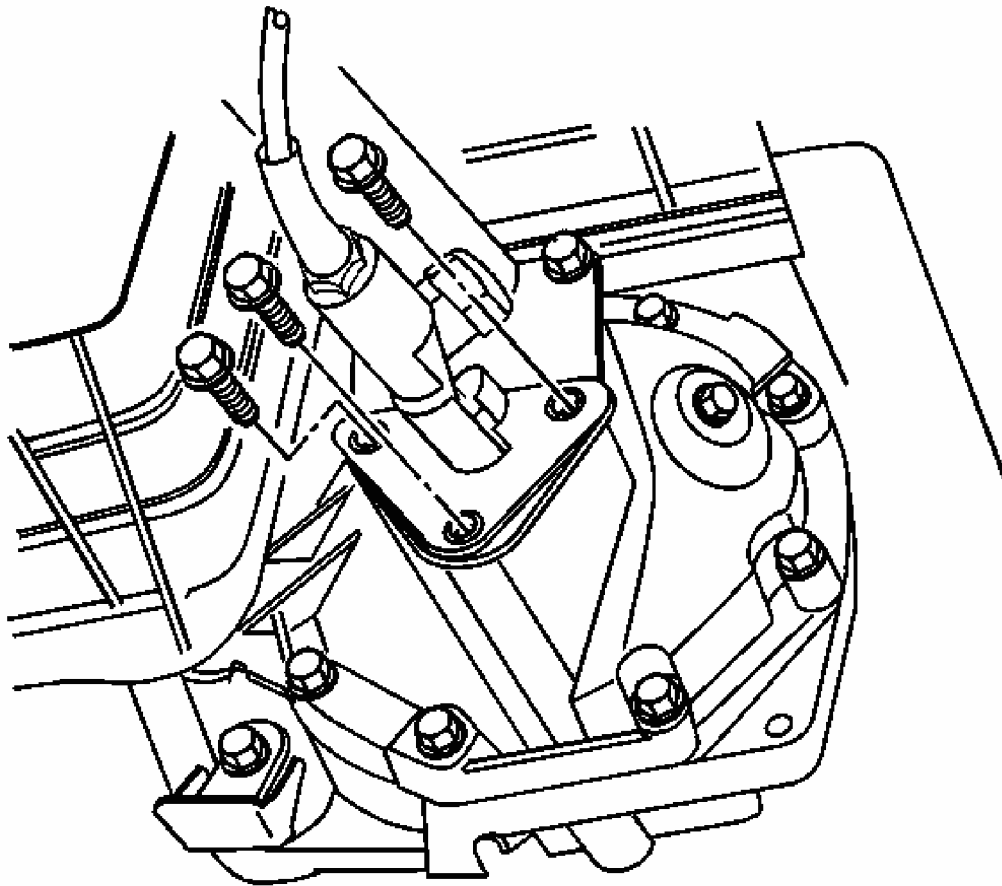


Fig. 61: Locating Clutch Cable Housing Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the clutch cable housing.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the clutch cable housing bolts.

Tighten: Tighten the clutch cable housing bolts to 48 N.m (36 lb ft).

3. Insert the clutch cable into the clutch fork.

Engage the spring retainer in order to retain the clutch cable.

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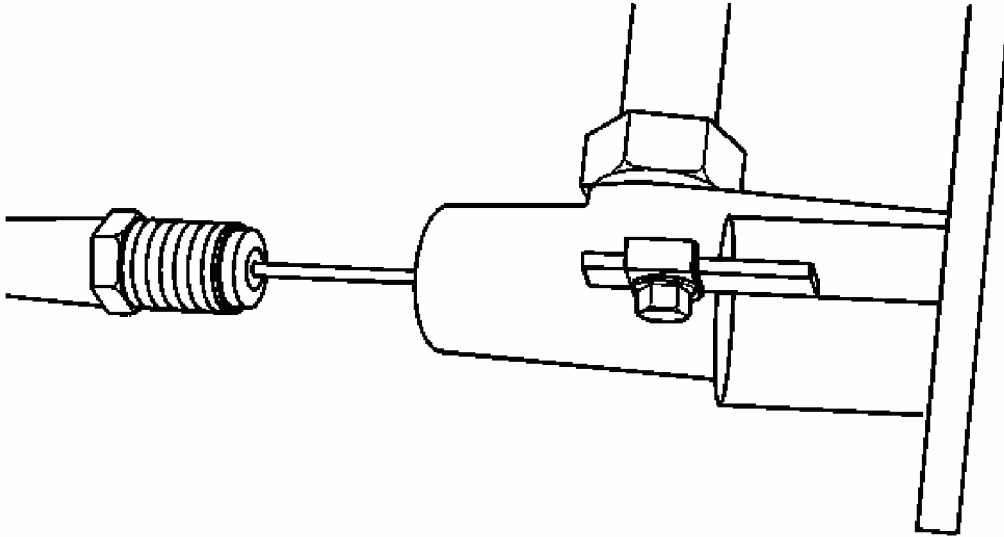


Fig. 62: Locating Clutch Cable Coupling Nut
Courtesy of GENERAL MOTORS CORP.

4. Install the clutch cable coupling nut to the clutch cable housing.

Tighten: Tighten the clutch cable coupling nut to 10 N.m (89 lb in).

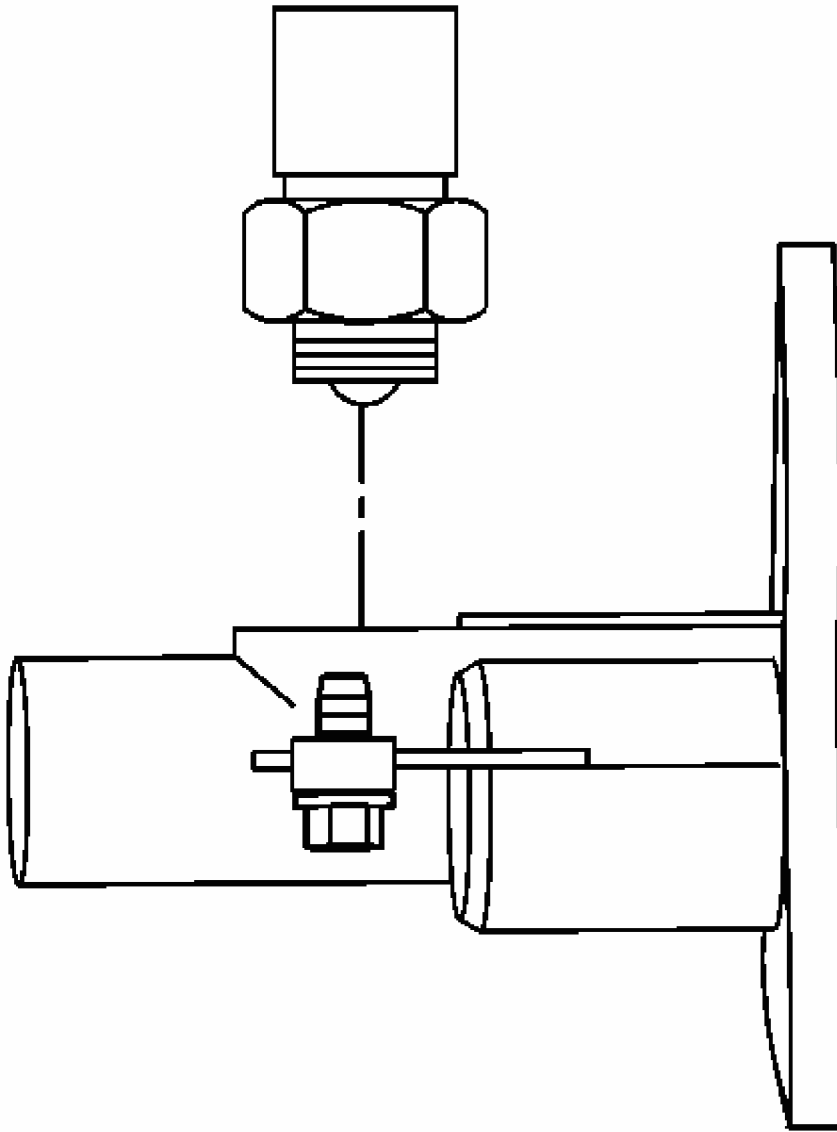


Fig. 63: View Of Four-Wheel Drive Indicator Switch
Courtesy of GENERAL MOTORS CORP.

5. Install the four-wheel drive indicator switch.

Tighten: Tighten the four-wheel drive indicator switch to 5 N.m (44 lb in).

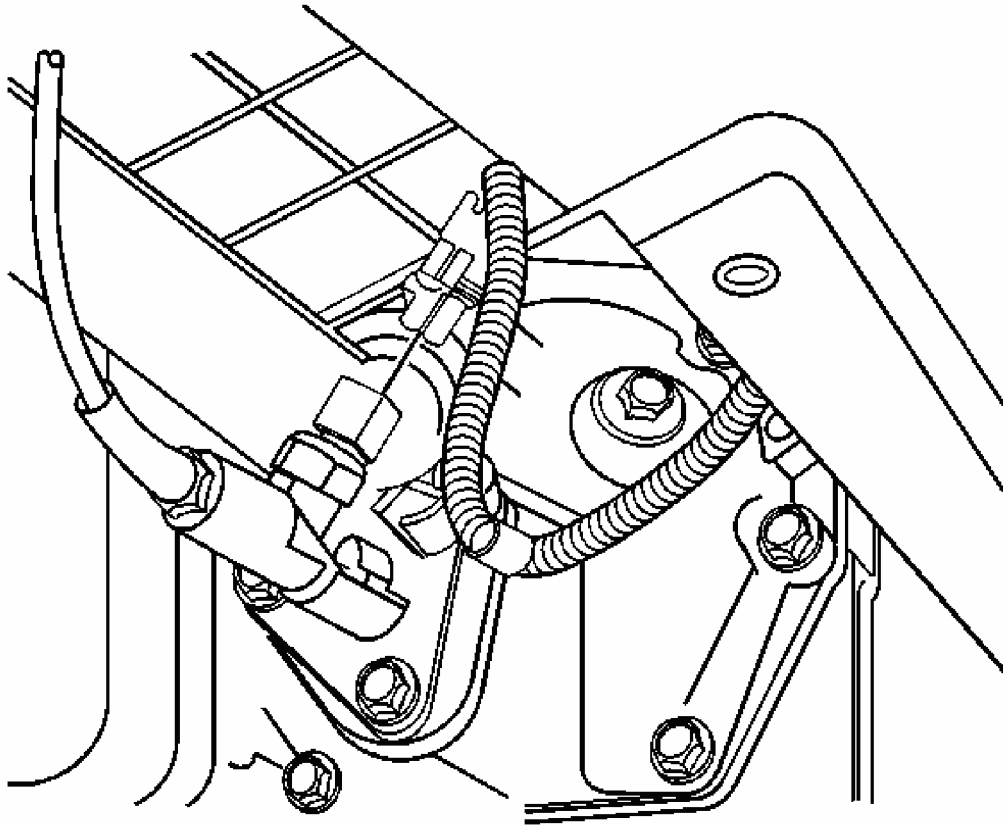


Fig. 64: View Of Four-Wheel Drive Indicator Switch Electrical Harness
Courtesy of GENERAL MOTORS CORP.

6. Connect the electrical connector to the four-wheel drive indicator switch.
7. Install the front differential carrier shield (if equipped). Refer to **Shield Replacement**.
8. Lower the vehicle.

INNER SHAFT AND/OR HOUSING REPLACEMENT - FRONT DRIVE AXLE (S4WD)

Tools Required

J 33799 Clutch Fork Housing Seal Installer. See **Special Tools and Equipment**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the right side wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

3. Disconnect the clutch cable from the clutch fork. Refer to **Clutch Cable Replacement - Front Drive Axle**.

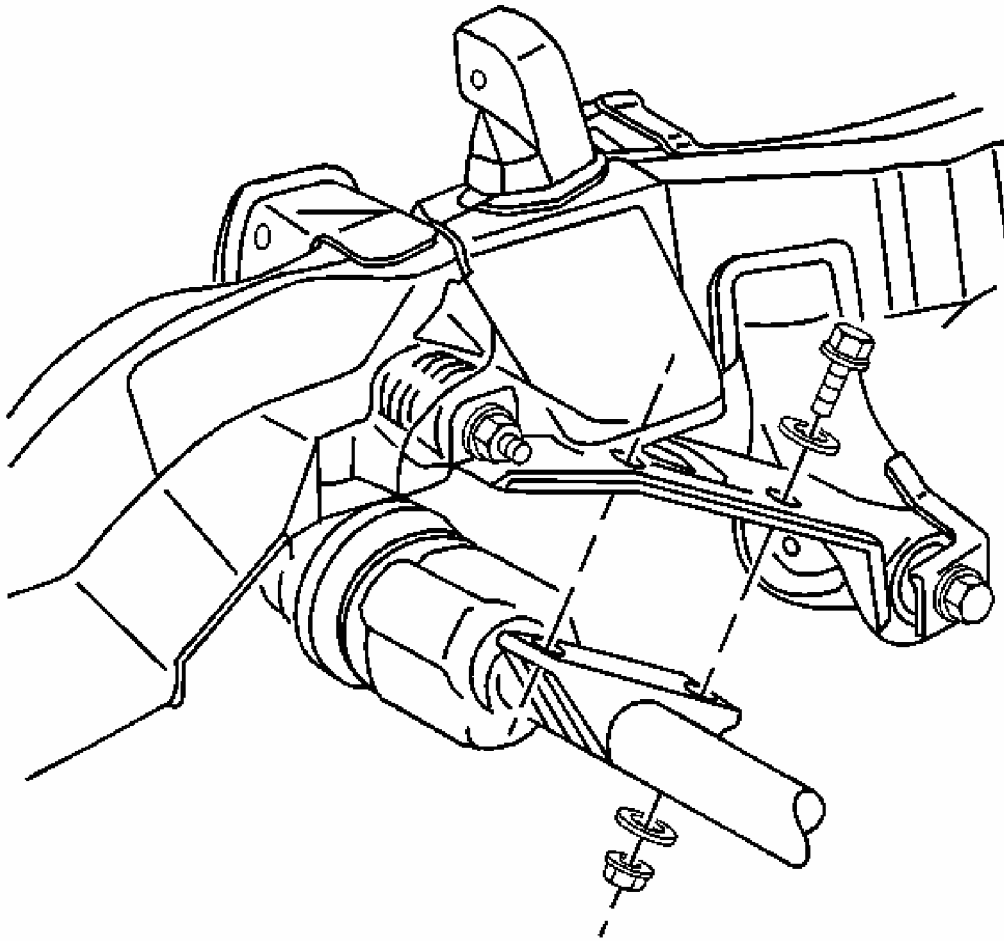


Fig. 65: View Of Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

4. Remove the bolts, the nuts, and the washers from the inner axle shaft housing.
5. Remove the remaining 2 inner axle shaft housing to differential carrier assembly bolts.

IMPORTANT: Do not allow the following components to fall out of the differential carrier assembly or become damaged:

- The thrust washers
- The clutch fork sleeve

• **The clutch fork inner axle shaft**

6. Remove the inner axle shaft and housing assembly by working the shaft and housing around the drive axle.
7. Remove the following components from the inner axle shaft housing:
 - A. The clutch cable retainer spring
 - B. The clutch fork assembly
 - C. The clutch fork inner spring
 - D. The clutch fork sleeve
 - E. The thrust washer
 - F. The clutch gear by doing the following:
 1. Clamp the inner shaft housing in a vise.

Clamp only on the mounting flange.
 2. Strike the inside surface of the axle shaft with a hammer and a brass drift in order to dislodge the clutch gear from the inner axle shaft.
 3. Remove the clutch gear.
8. Remove the thrust washer.
9. Remove the inner axle shaft.
10. Remove the clutch fork seal.

Use a punch to drive out the seal.

11. Remove the inner axle seal and the bearing from the inner axle shaft housing. Refer to **Inner Axle Seal and/or Bearing Replacement - Front Drive Axle**.

Installation Procedure

1. Install the new inner axle shaft bearing and the seal to the axle housing. Refer to **Inner Axle Seal and/or Bearing Replacement - Front Drive Axle**.

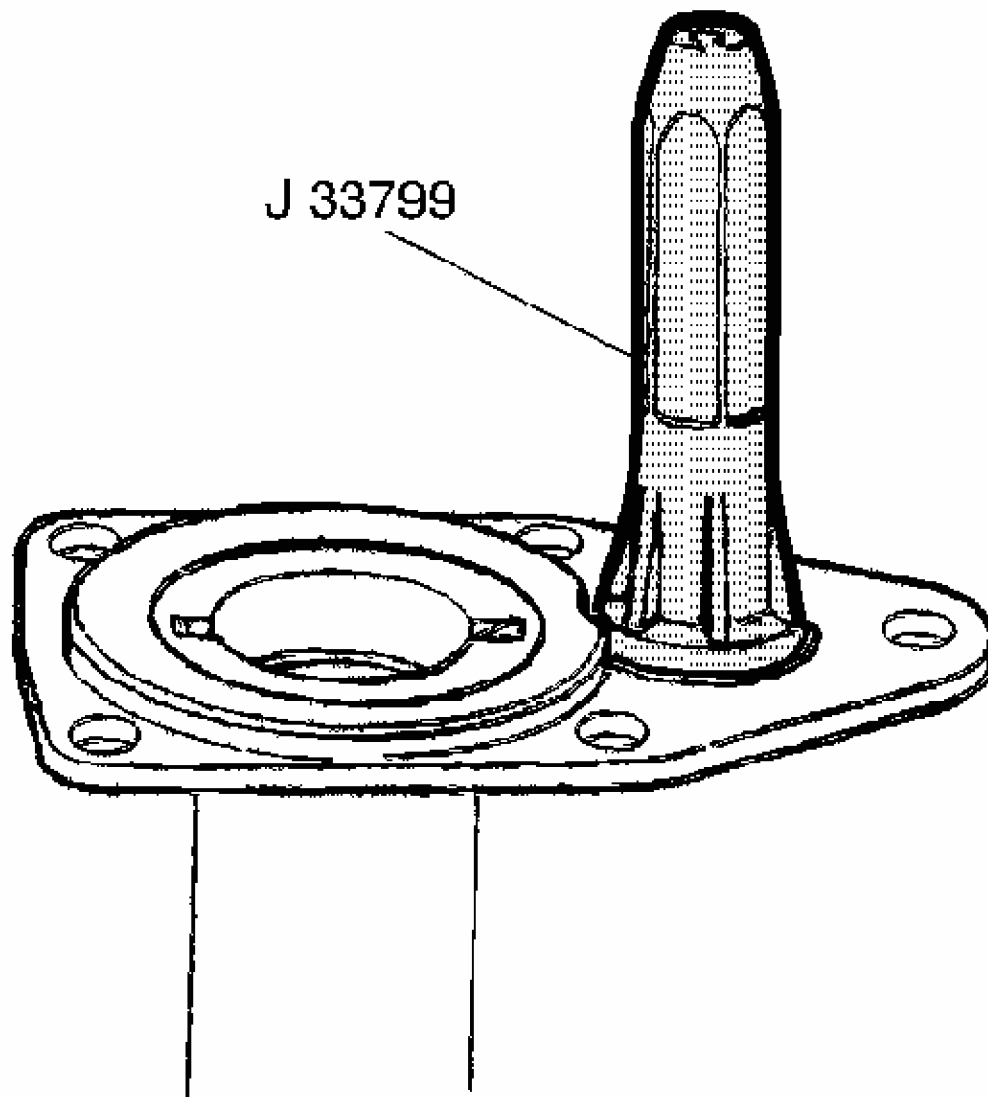


Fig. 66: Installing Clutch Fork Seal
Courtesy of GENERAL MOTORS CORP.

2. Install the new clutch fork seal using the **J 33799** .
3. Install the inner axle shaft into the inner axle shaft housing.

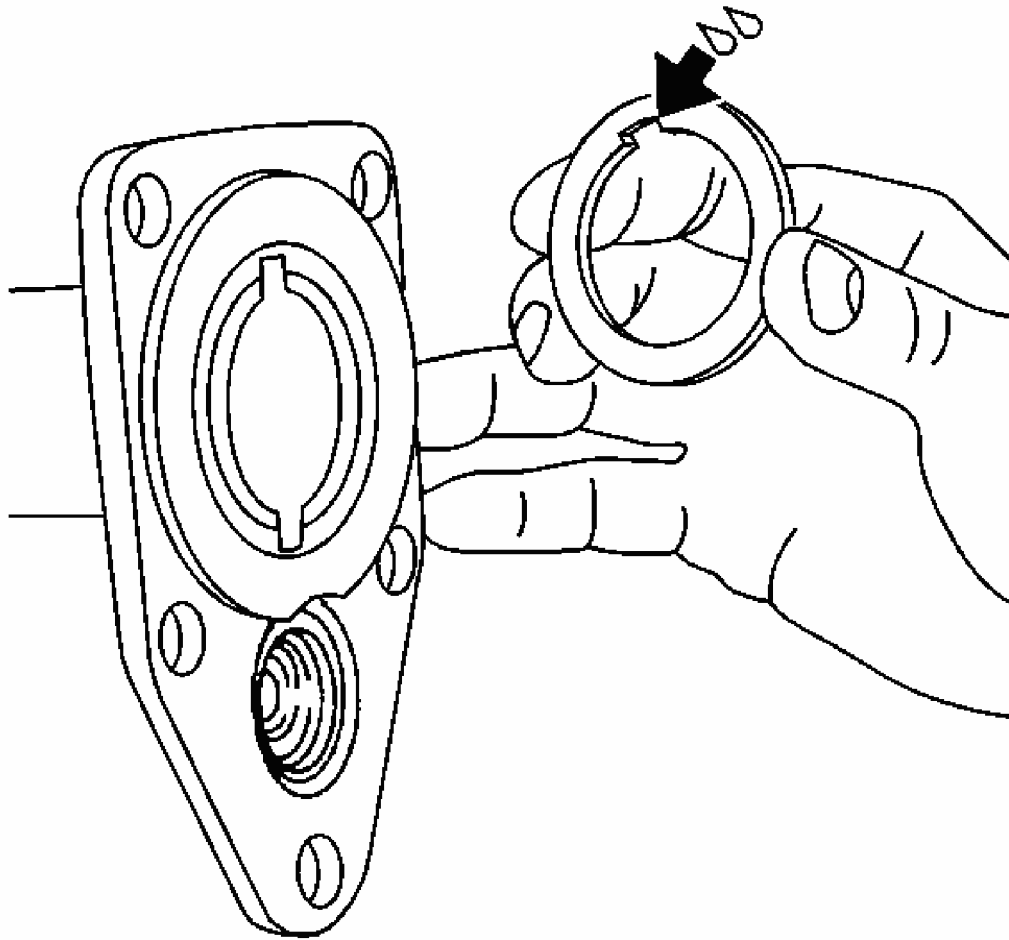


Fig. 67: Installing Thrust Washer Into Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

4. Install the thrust washer into the inner axle shaft housing. Use chassis grease in order to hold the thrust washer in place.

Ensure the tabs on the thrust washer align with the slot in the inner axle shaft housing.

5. Install the new retaining ring into the clutch gear.
6. Install the clutch gear onto the inner axle shaft.

Drive the clutch gear into place with a plastic hammer.

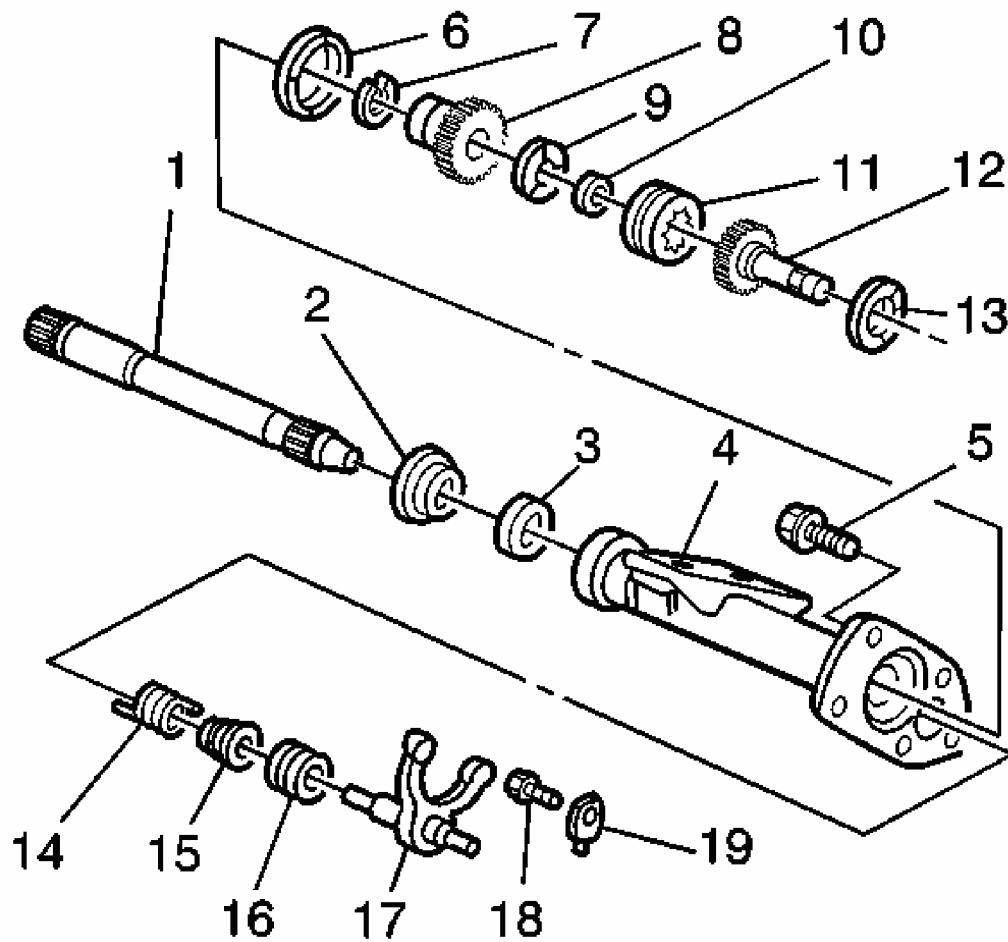


Fig. 68: Locating Inner Axle Shaft Housing Components
 Courtesy of GENERAL MOTORS CORP.

7. Install the following components into the inner axle shaft housing:
 - The thrust washer (9)
 - The clutch fork inner spring (16)
 - The clutch fork (17)
 - The clutch fork sleeve (11)
 - The clutch cable retainer spring (15)
8. Apply sealant (GM P/N 1052492 or equivalent) to the inner axle housing to differential carrier sealing surface.
9. Install the inner axle shaft housing to the differential carrier assembly.
10. Install the inner axle shaft housing bolt at the 1 o'clock position.

Tighten the bolt finger tight.

11. Pull the inner axle shaft housing down in order to install the bolt at the 11 o'clock position.

Tighten the bolt finger tight.

12. Install the clutch cable housing and the clutch cable. Refer to **Clutch Cable Replacement - Front Drive Axle**.

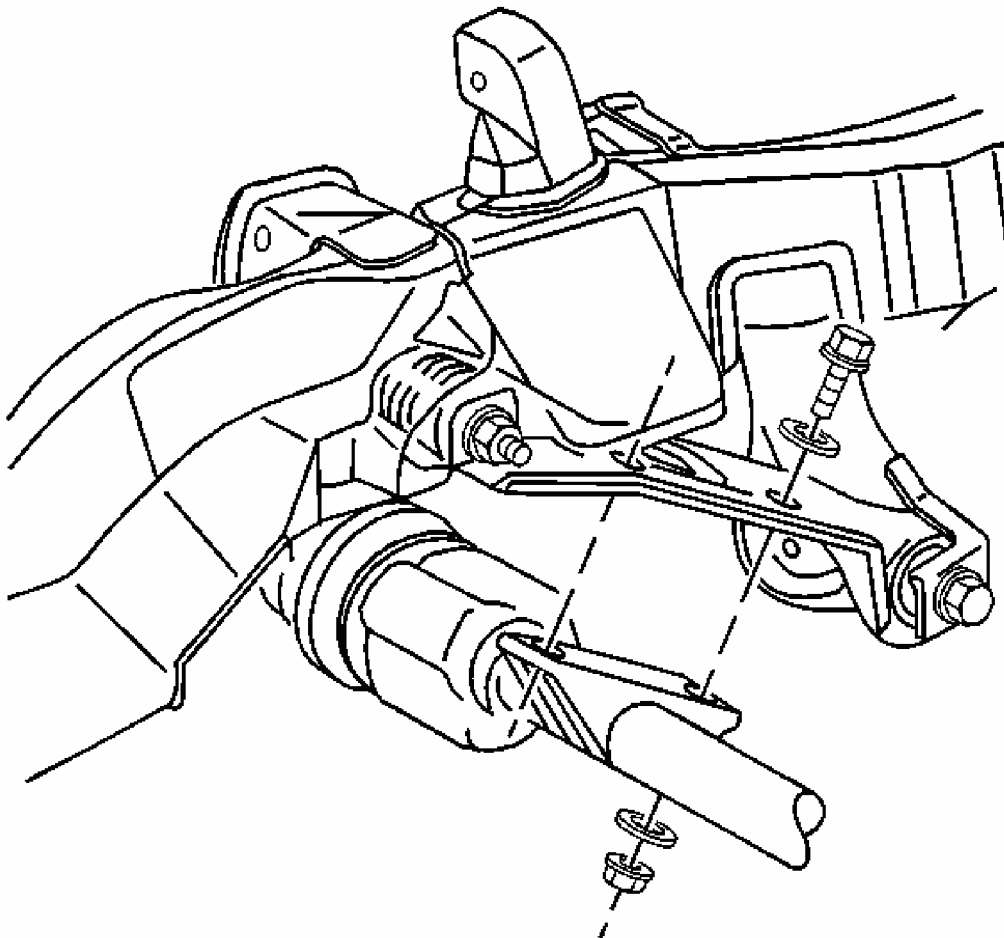


Fig. 69: View Of Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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13. Install the inner axle shaft housing to the frame bracket bolts, washers, and the nuts.

Tighten:

- Tighten the inner axle shaft housing frame bracket nuts to 98 N.m (72 lb ft).
- Tighten the inner axle shaft housing to differential carrier assembly bolts to 48 N.m (36 lb ft).

14. Install the right side wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

15. Inspect the axle lubricant level and add, if necessary. Refer to **Lubricant Level Inspection - Front Drive Axle**.

16. Lower the vehicle.

INNER SHAFT AND/OR HOUSING REPLACEMENT - FRONT DRIVE AXLE (A4WD)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the right side wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
3. Disconnect the inner axle shaft from the differential case side gear.

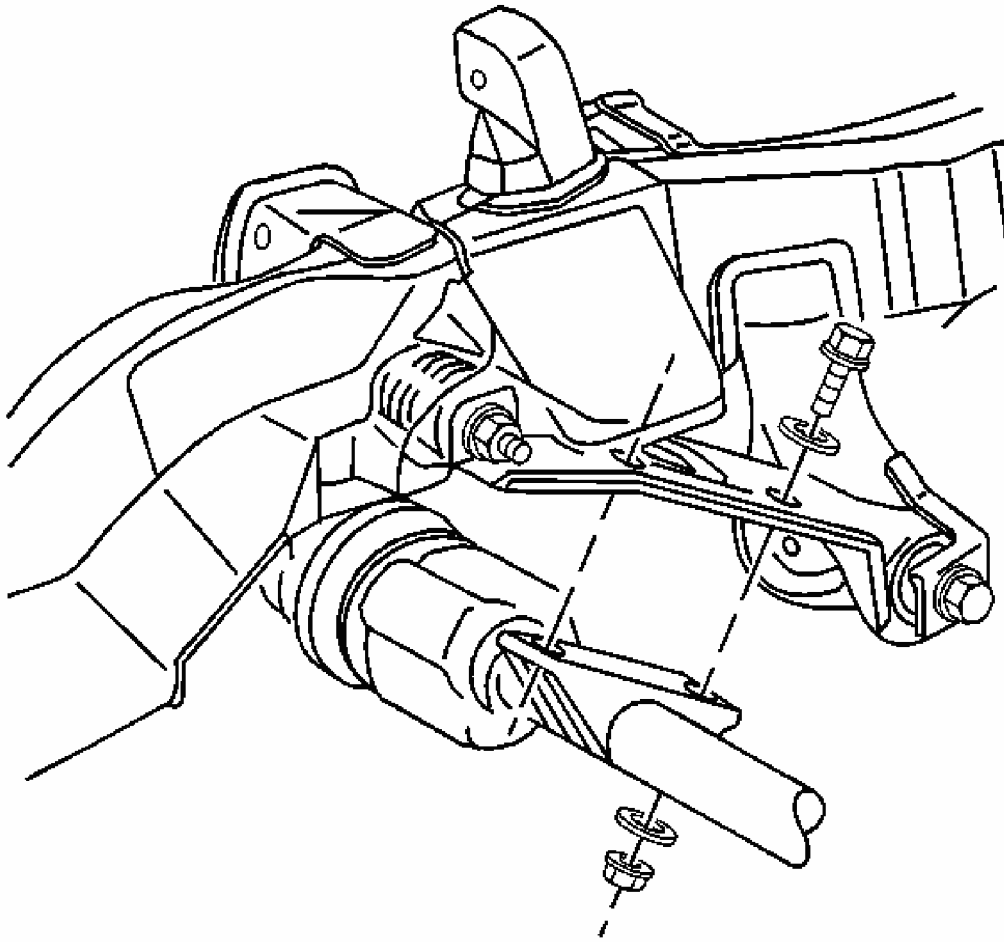


Fig. 70: View Of Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

4. Remove the bolts, the nuts, and the washers from the inner axle shaft housing.
5. Remove the inner axle shaft housing to differential carrier assembly bolts.
6. Remove the inner axle shaft and housing from the differential carrier assembly.
7. Remove the inner axle shaft from the inner axle shaft housing.
8. Remove the inner axle seal and the bearing from the axle housing. Refer to **Inner Axle Seal and/or Bearing Replacement - Front Drive Axle**.

Installation Procedure

1. Install the new inner axle shaft bearing and the seal to the axle housing. Refer to **Inner Axle Seal and/or Bearing Replacement - Front Drive Axle**.
2. Install the inner axle shaft into the inner axle shaft housing.

3. Apply sealant GM P/N 1052942 (Canadian P/N 10953466) or equivalent to the inner axle housing to differential carrier sealing surface.
4. Install the inner axle shaft housing to the differential carrier assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the inner axle shaft housing bolts.

Tighten the bolts finger tight.

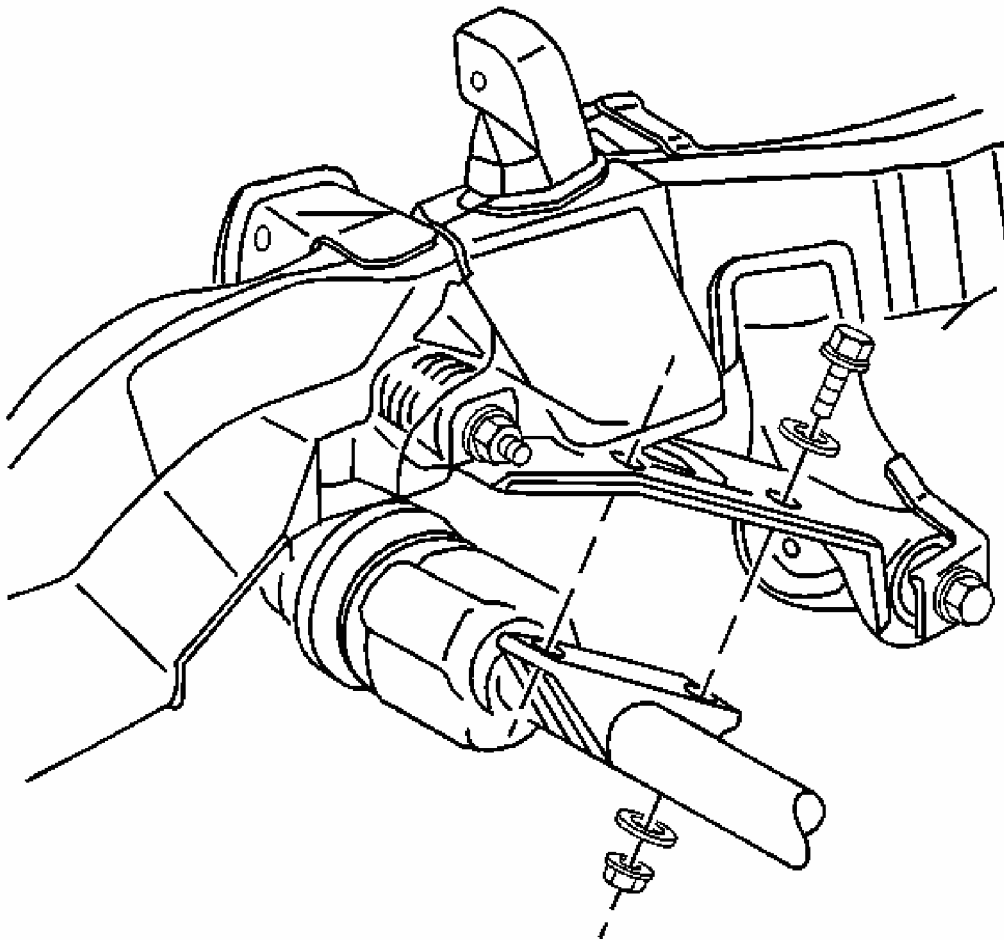


Fig. 71: View Of Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

6. Install the inner axle shaft housing to the frame bracket bolts, washers, and the nuts.

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Tighten:

- Tighten the inner axle shaft housing to frame bracket nuts to 98 N.m (72 lb ft).
 - Tighten the inner axle shaft housing to differential carrier assembly bolts to 48 N.m (36 lb ft).
7. Install the right side wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
 8. Inspect the axle lubricant level and add, if necessary. Refer to **Lubricant Level Inspection - Front Drive Axle**.
 9. Lower the vehicle.

CLUTCH FORK REPLACEMENT - FRONT DRIVE AXLE

Tools Required

J 33799 Shift Cable Housing Seal Installer. See **Special Tools and Equipment**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the inner axle shaft and housing assembly. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.

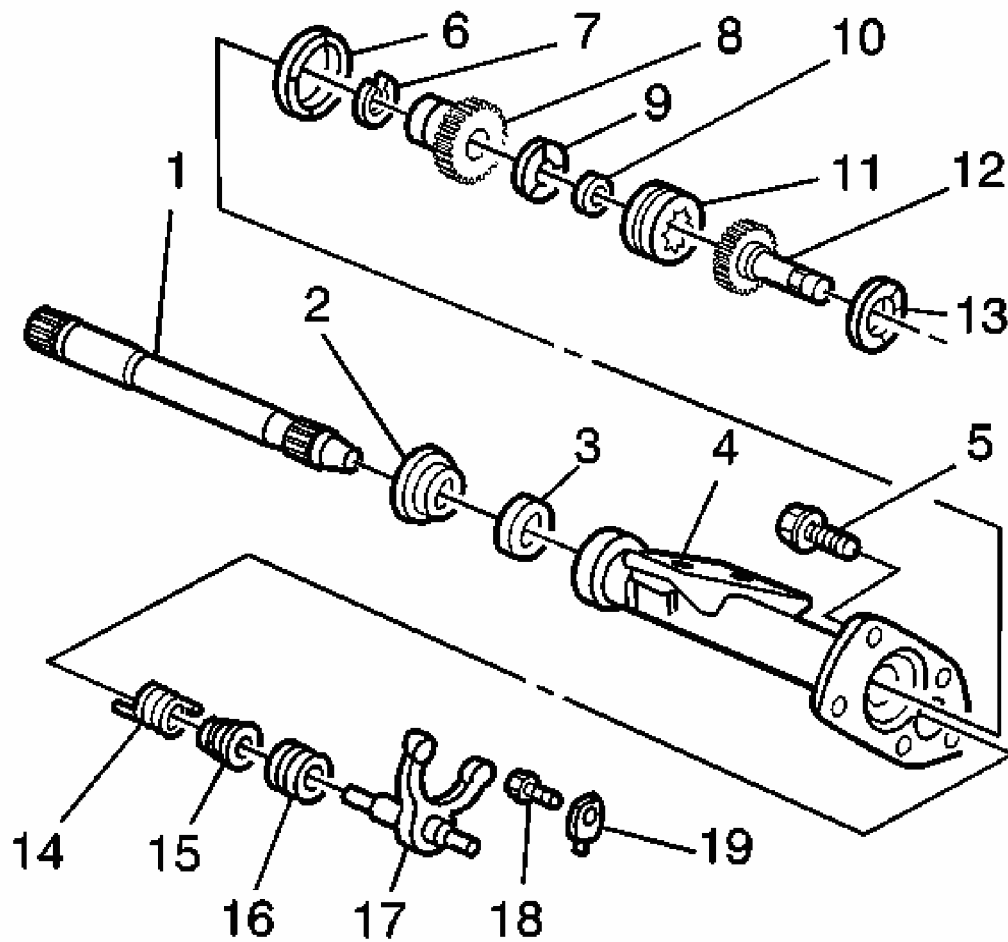


Fig. 72: Locating Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS CORP.

3. Remove the clutch cable retainer spring (14) from the clutch fork (17).
4. Remove the clutch fork (17) and the clutch fork inner spring (16) from the inner axle shaft housing.
5. Remove the clutch fork housing seal (15) from the inner axle shaft housing (4).

Use a punch to drive out the seal.

Installation Procedure

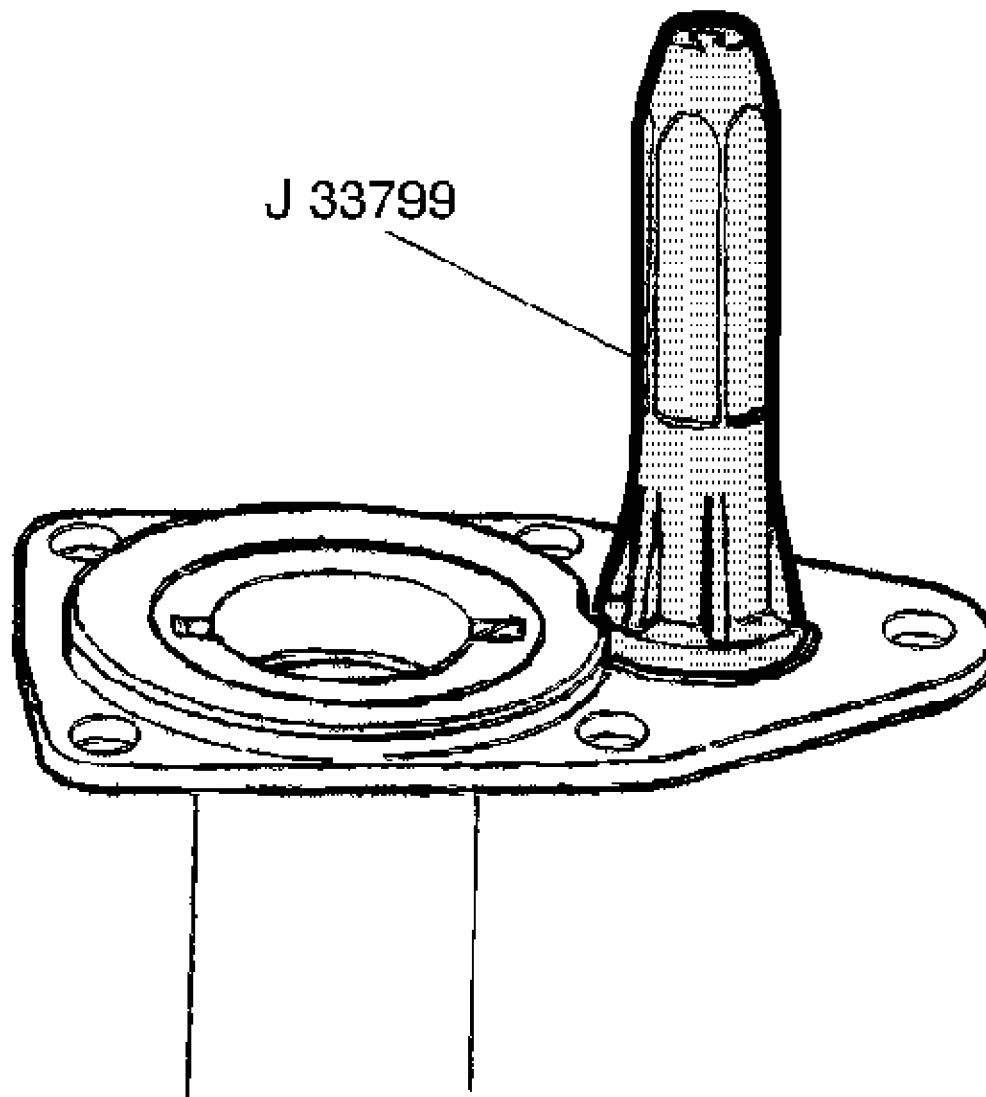


Fig. 73: Installing Clutch Fork Seal
Courtesy of GENERAL MOTORS CORP.

1. Install the new clutch fork housing seal using the **J 33799** .

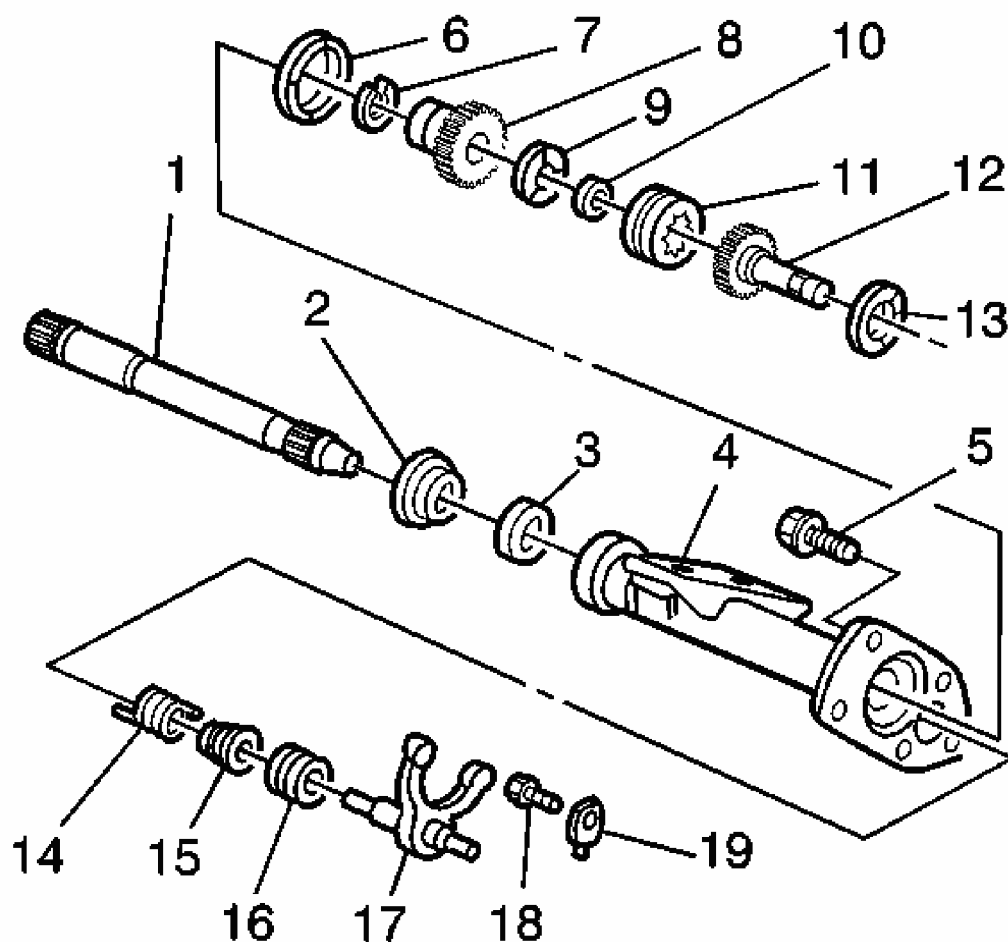


Fig. 74: Locating Inner Axle Shaft Housing Components
 Courtesy of GENERAL MOTORS CORP.

2. Install the new clutch fork (17) and clutch fork inner spring (16) into the inner axle shaft housing.
3. Install the clutch cable retainer spring (14) onto the clutch fork (17).
4. Install the inner axle shaft and housing assembly. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.
5. Lower the vehicle.

CLUTCH FORK INSPECTION - FRONT DRIVE AXLE

- Inspect the carrier connector for damaged splines and teeth. Replace as required.
- Inspect the shift fork for wear, scoring, and damage to the thrust surfaces. Replace as

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required.

- Inspect the differential sleeve and the inner output shaft for damaged splines and teeth. Replace as required.
- Inspect the damper spring for breakage. Replace or repair the damper spring as needed.
- Inspect the differential actuator and the engagement switch for damage and frayed wiring.

CLUTCH SHAFT BEARING REPLACEMENT - FRONT DRIVE AXLE

Tools Required

- **J 34011** Pilot Bearing Remover. See Special Tools and Equipment.
- **J 33842** Pilot Bearing Installer. See Special Tools and Equipment.

Removal Procedure

1. Remove the inner axle shaft and housing assembly. Refer to Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD) or Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD).
2. Remove the clutch shaft from the differential carrier assembly.

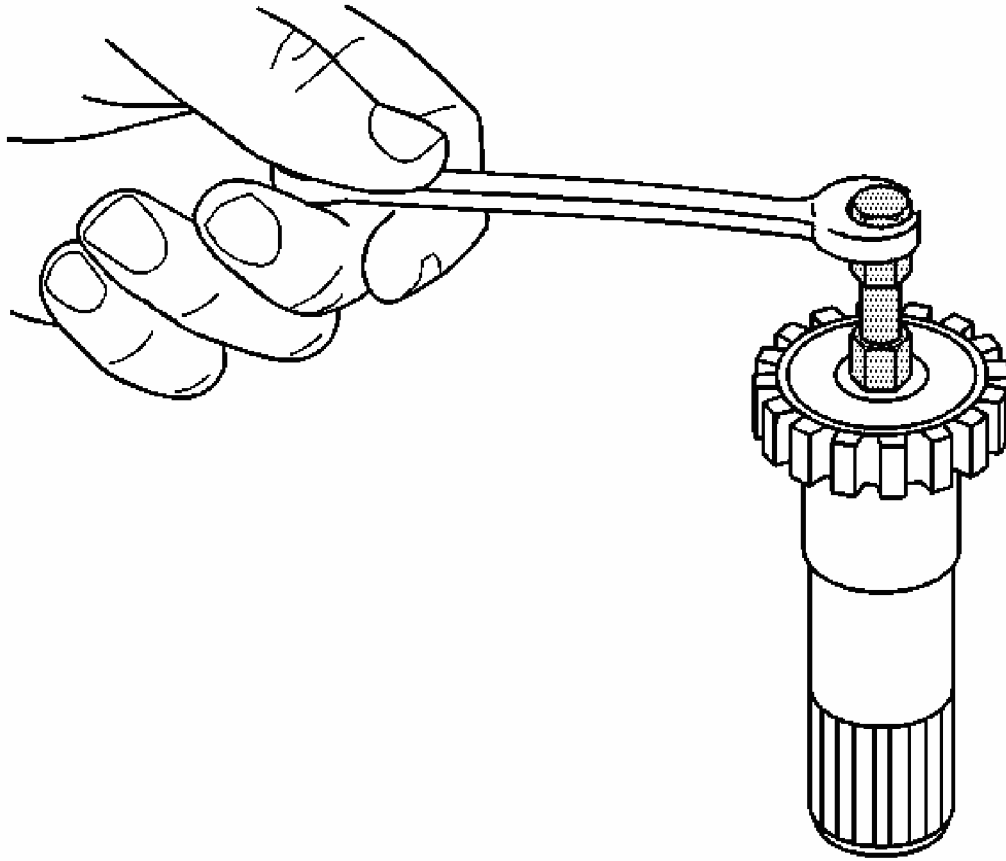


Fig. 75: Removing Clutch Shaft Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

3. Remove the clutch shaft pilot bearing using the J 34011 .

Installation Procedure

1. Lubricate the bearing with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

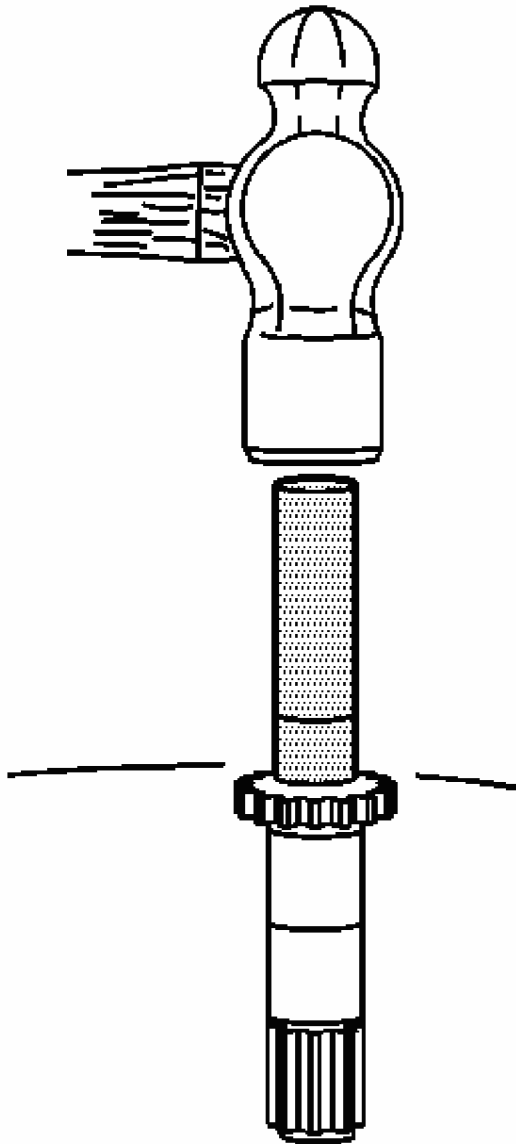


Fig. 76: Installing Clutch Shaft Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the clutch shaft pilot bearing using the **J 33842**.
3. Install the clutch shaft to the differential carrier assembly.
4. Install the inner axle shaft and housing assembly. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.

INNER AXLE SEAL AND/OR BEARING REPLACEMENT - FRONT DRIVE AXLE

Tools Required

- **J 23907** Slide Hammer with Bearing Adapter. See **Special Tools and Equipment**.
- **J 29369-1** Bushing and Bearing Remover. See **Special Tools and Equipment**.
- **J 42211** Axle Bearing Installer. See **Special Tools and Equipment**.
- **J 42738** Seal Installer. See **Special Tools and Equipment**.
- **J 8092** Universal Driver Handle - 3/4 in-10

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the left or the right wheel drive shaft as necessary. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

IMPORTANT: Do not damage the case.

3. If replacing the left side seal and/or bearing, perform the following steps:
 1. For Oldsmobile only, remove the left inner axle shaft.
 2. Remove the inner axle shaft seal cover.
 3. Install the **J 29369-1** to the backside of the inner axle shaft bearing.
 4. Install the **J 23907** to the **J 29369-1** .
 5. Remove the inner axle shaft bearing by pulling on the **J 23907** .
4. Mount the inner axle shaft seal cover in a vise.
5. Install the **J 29369-1** to the backside of the inner axle shaft seal.
6. Install the **J 23907** to the **J 29369-1** .
7. Remove the inner axle shaft seal by pulling on the **J 23907** .
8. If replacing the right side seal and/or bearing, perform the following steps:
 - A. Remove the inner axle shaft and housing assembly. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.
 - B. Remove the inner axle shaft from the inner axle shaft housing. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.

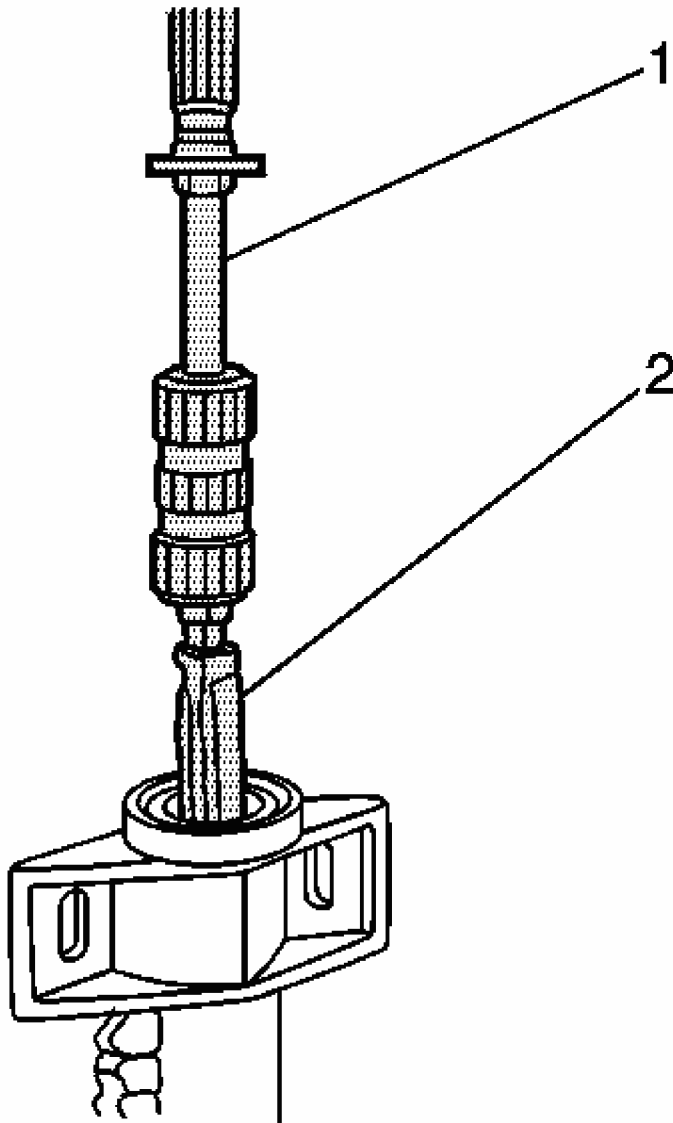


Fig. 77: Removing Inner Axle Shaft Bearing & Seal
Courtesy of GENERAL MOTORS CORP.

- C. Install the **J 29369-1** (2) to the backside of the bearing.
- D. Install the **J 23907** (1) to the **J 29369-1** (2).
- E. Remove the bearing and the seal by pulling on the **J 23907** (1).

Installation Procedure

1. If installing the right side bearing and/or seal, perform the following steps:

- A. Install the bearing with the square shoulder in using the **J 42211** and the **J 8092** .

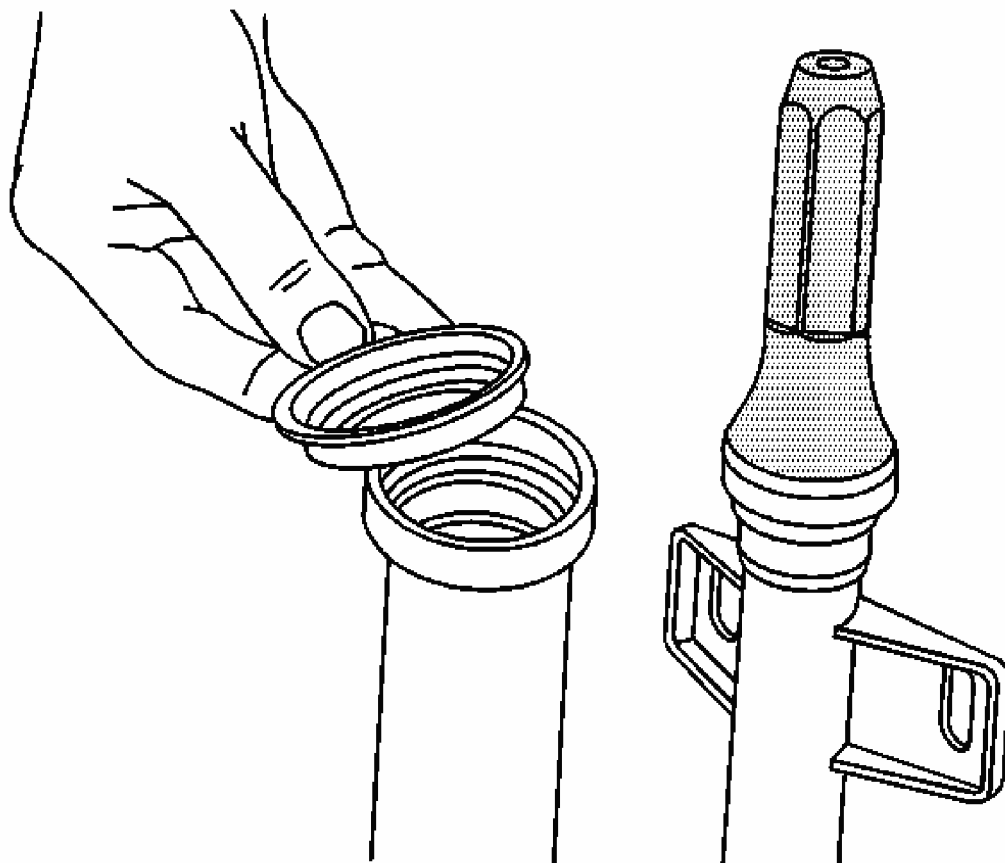


Fig. 78: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS CORP.

- B. Install the new axle shaft seal using the **J 42738** .
- C. Install the inner axle shaft to the inner axle shaft housing. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.
- D. Install the inner axle shaft and housing assembly. Refer to **Inner Shaft and/or Housing Replacement - Front Drive Axle (S4WD)** or **Inner Shaft and/or Housing Replacement - Front Drive Axle (A4WD)**.
2. If installing the left side bearing and/or seal, perform the following steps:
- A. Install the bearing with the square shoulder in using the **J 42211** and the **J 8092** .
- B. Install the new axle shaft seal into the inner axle shaft seal cover using the **J 42738** .

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3. Install the inner axle shaft seal cover.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

4. Install the inner axle shaft seal cover bolts.

Tighten: Tighten the inner axle shaft seal cover to 25 N.m (18 lb ft).

5. For Oldsmobile only, install the left inner axle shaft.

Carefully tap the inner axle shaft into place with a soft mallet.

6. Install the wheel drive shaft. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
7. Inspect the axle lubricant level and add, if necessary. Refer to **Lubricant Level Inspection - Front Drive Axle**.
8. Lower the vehicle.

ACTUATOR REPLACEMENT - FRONT DRIVE AXLE

Removal Procedure

1. Remove the battery and battery tray. Refer to **Battery Tray Replacement** in Engine Electrical.



Fig. 79: View Of Vacuum Hose At Vacuum Actuator
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the vacuum hose from the vacuum actuator.

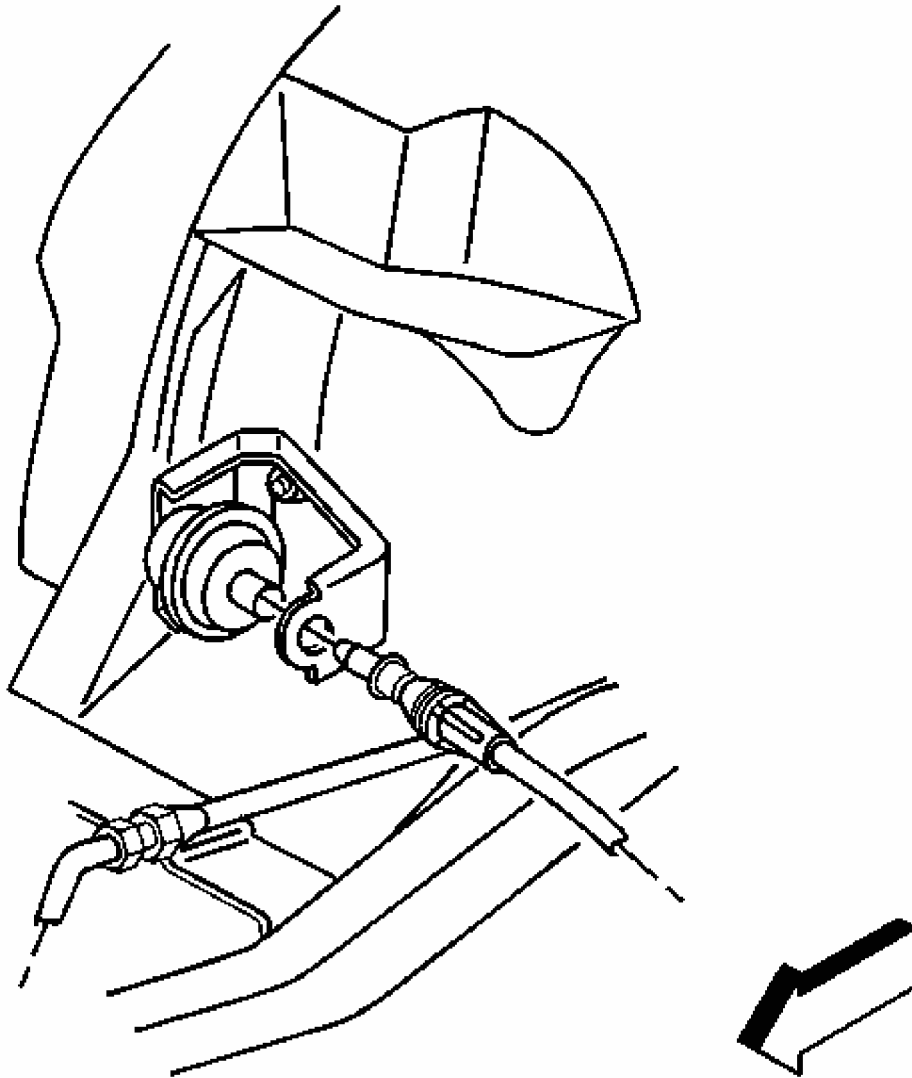


Fig. 80: View Of Clutch Cable
Courtesy of GENERAL MOTORS CORP.

3. Disconnect front drive axle clutch cable.

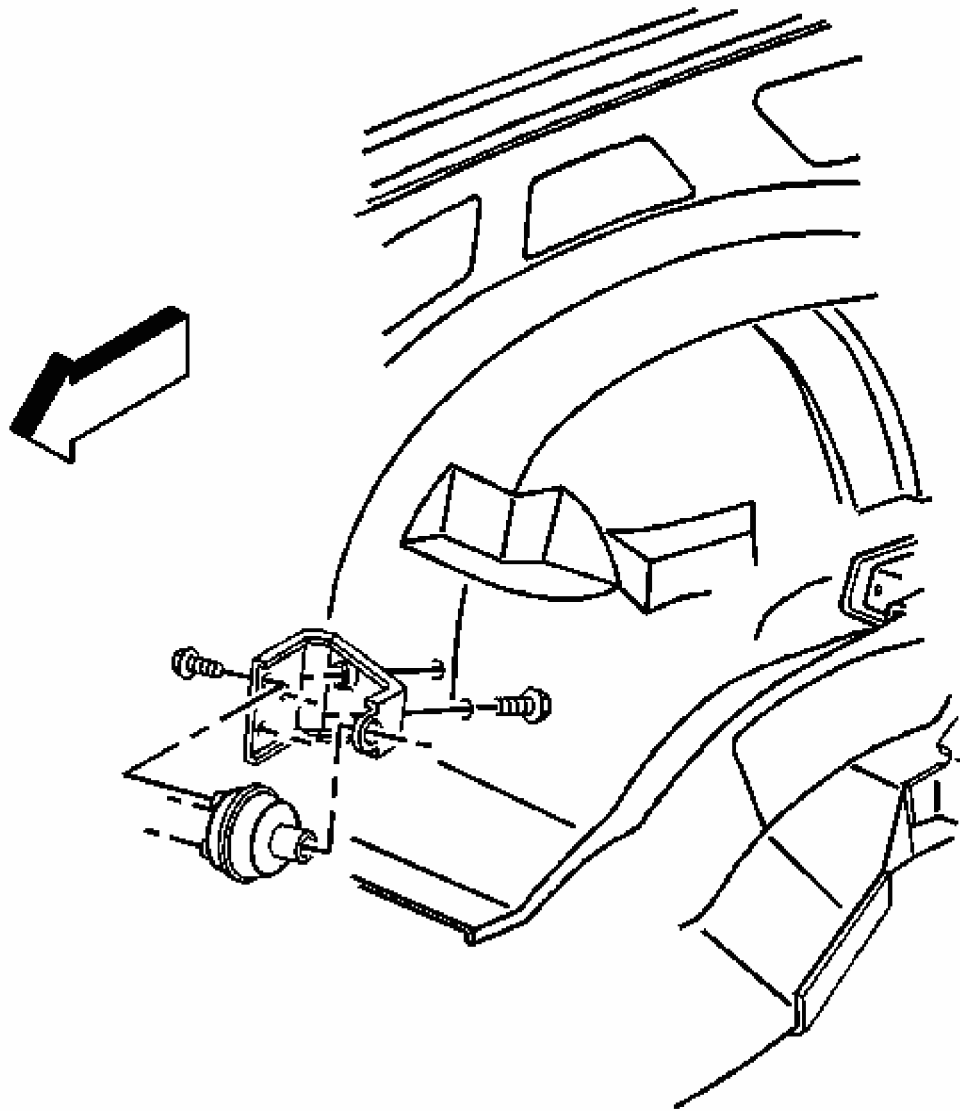


Fig. 81: Locating Vacuum Actuator Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the vacuum actuator bolts.
5. Remove the vacuum actuator.

Installation Procedure

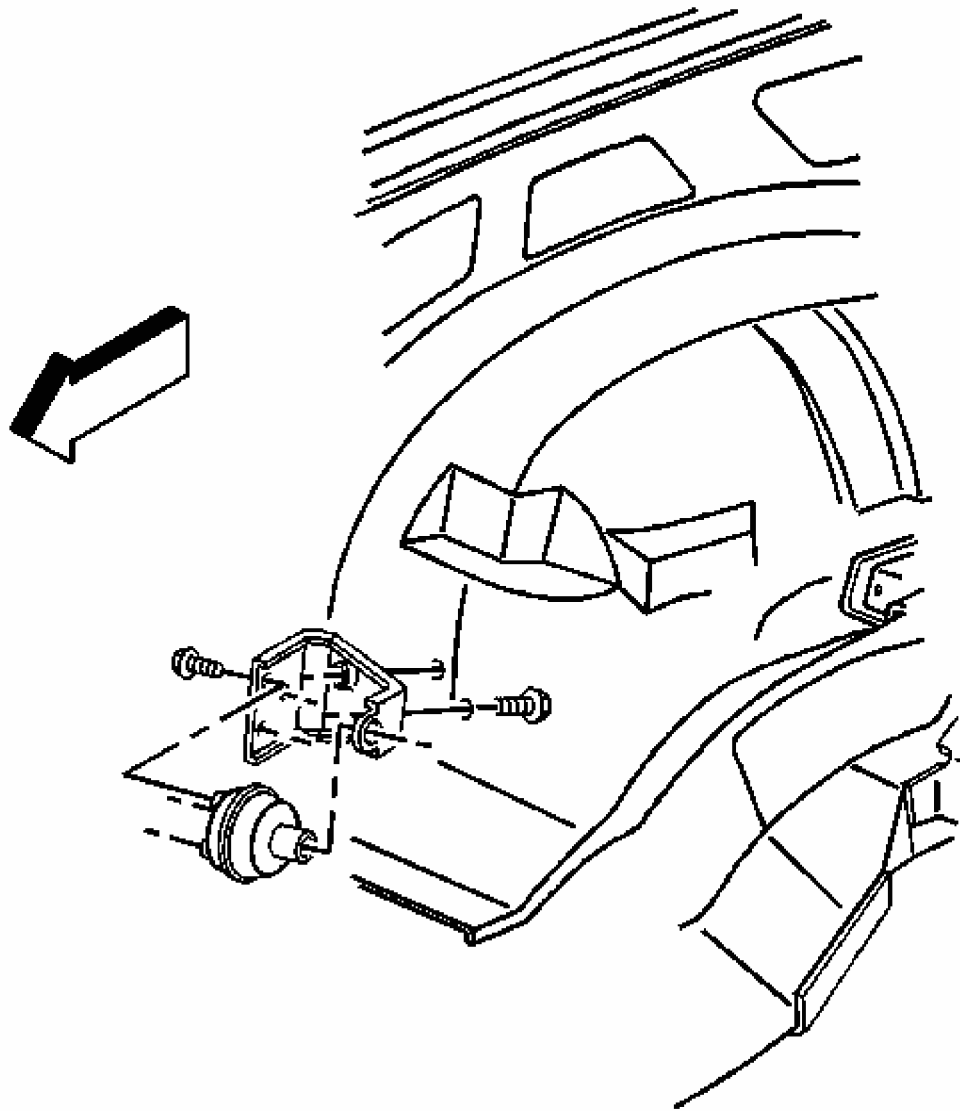


Fig. 82: Locating Vacuum Actuator Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the vacuum actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the vacuum actuator bolts.

Tighten: Tighten the bolts to 1.4 N.m (12 lb in).

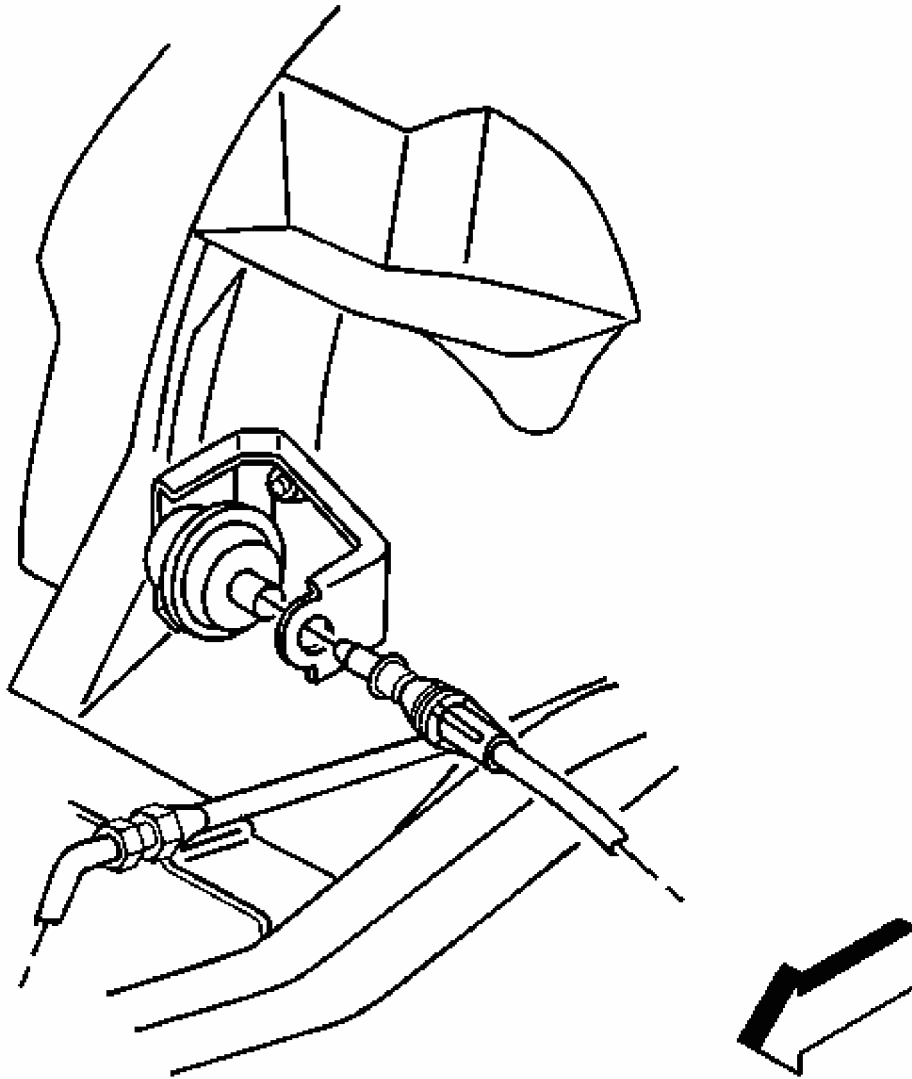


Fig. 83: View Of Clutch Cable
Courtesy of GENERAL MOTORS CORP.

3. Connect the front drive axle clutch cable.

The front drive axle clutch cable must engage the vacuum actuator retainer spring.



Fig. 84: View Of Vacuum Hose At Vacuum Actuator
Courtesy of GENERAL MOTORS CORP.

4. Connect the vacuum hose.
5. Install the battery tray and the battery. Refer to **Battery Tray Replacement** in Engine Electrical.

Tools Required

- **J 33782** Pinion Seal Installer. See Special Tools and Equipment.
- **J 8614-01** Flange and Pulley Holding Tool. See Special Tools and Equipment.

Removal Procedure

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
2. Remove the tire and wheel assemblies. Refer to Tire and Wheel Removal and Installation in Tires and Wheels.
3. Remove the brake calipers. Refer to Brake Caliper Replacement - Front (Dual Piston) in Disc Brakes.
4. Remove the brake rotors.
5. Remove the front differential carrier assembly shield, if equipped. Refer to Shield Replacement.
6. Remove the left front differential carrier assembly shield bracket.
7. Reference mark the relationship of the propeller shaft to the front axle pinion yoke.

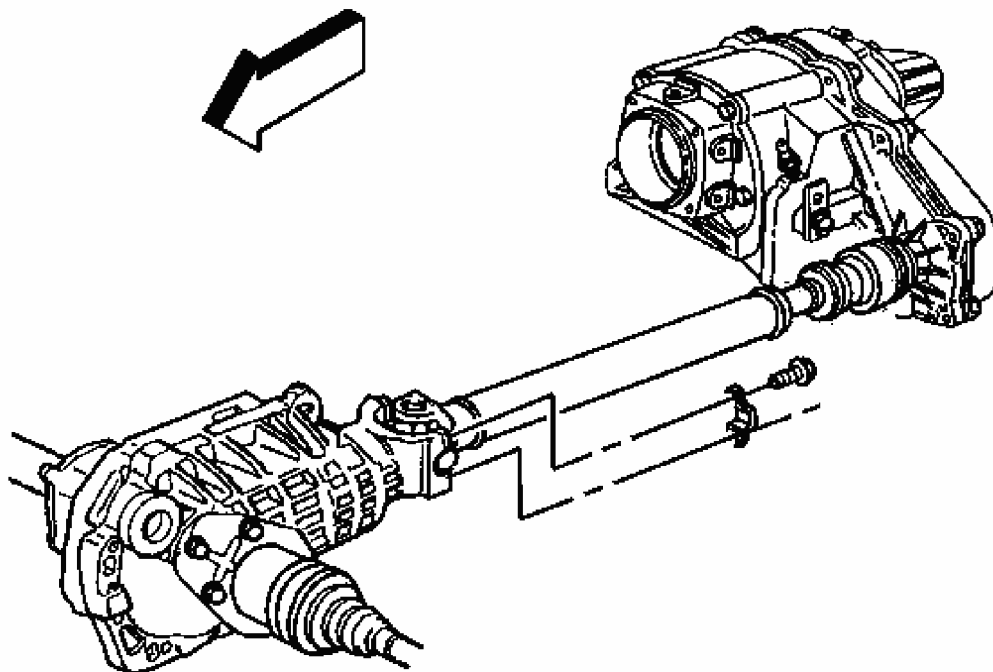


Fig. 85: View Of Front Axle Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

8. Remove the yoke retainer bolts and the yoke retainers from the front axle pinion yoke.

NOTE: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such means, the injection joints may fracture and lead to premature failure of the joint.

9. Disconnect the propeller shaft from the front axle pinion yoke.

Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

10. Support the propeller shaft and move out of the way as necessary.

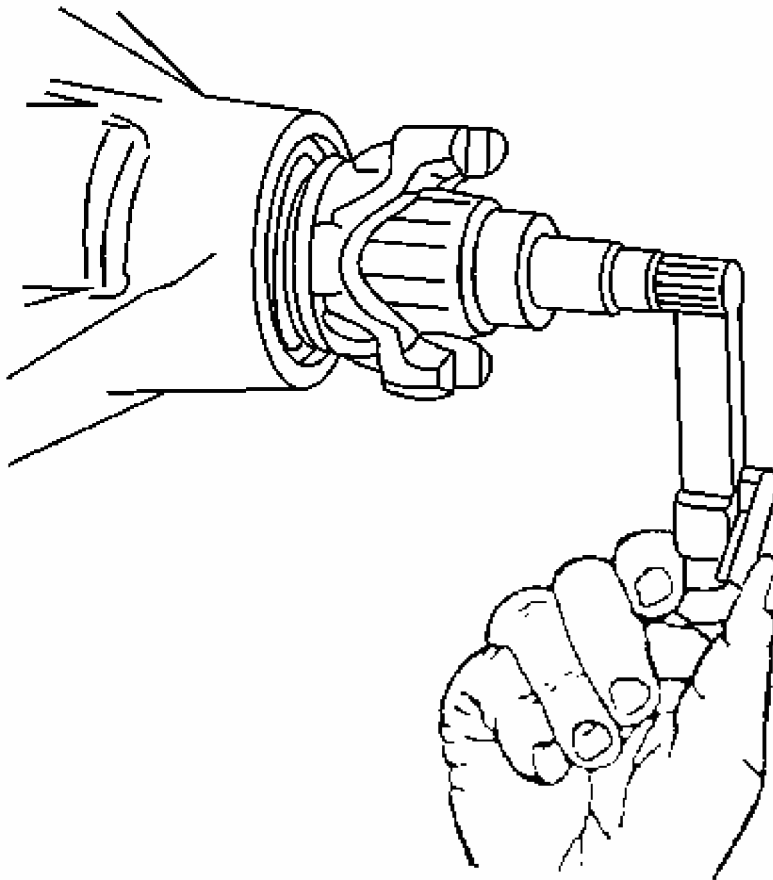


Fig. 86: Measuring Pinion Rotation Torque - Front Axle

Courtesy of GENERAL MOTORS CORP.

11. Measure the torque required in order to rotate the pinion. Use an inch-pound torque wrench. Record the torque value for reassembly. This will give the combined preload for the following components:
- The pinion bearings
 - The pinion seal
 - The carrier bearings
 - The axle bearings
 - The axle seals

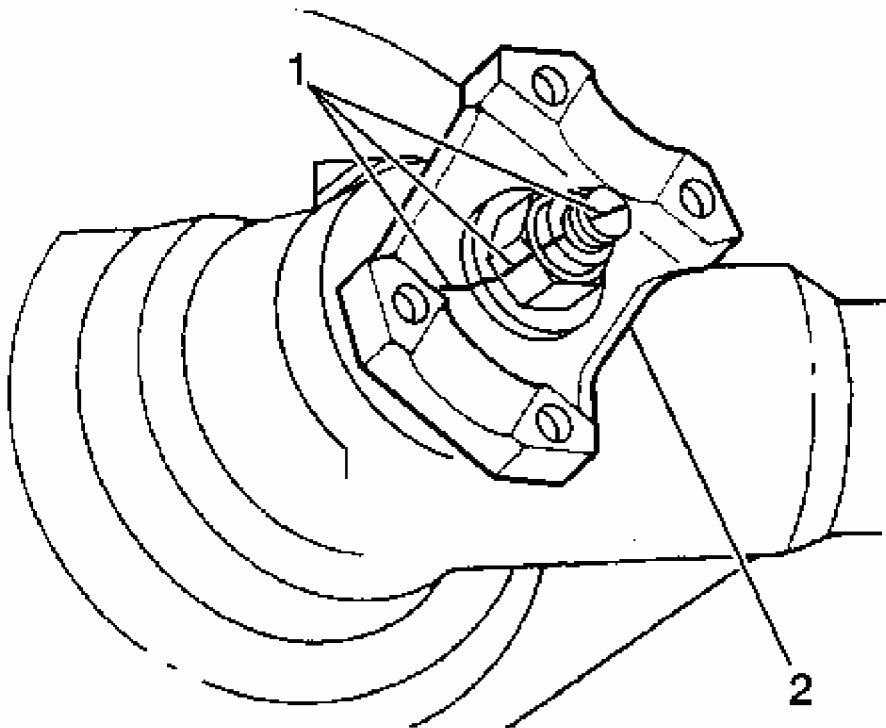


Fig. 87: Locating Pinion Shaft & Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

12. Scribe a line (1) on the pinion shaft and the pinion yoke (2). Record the number of exposed threads on the pinion shaft.

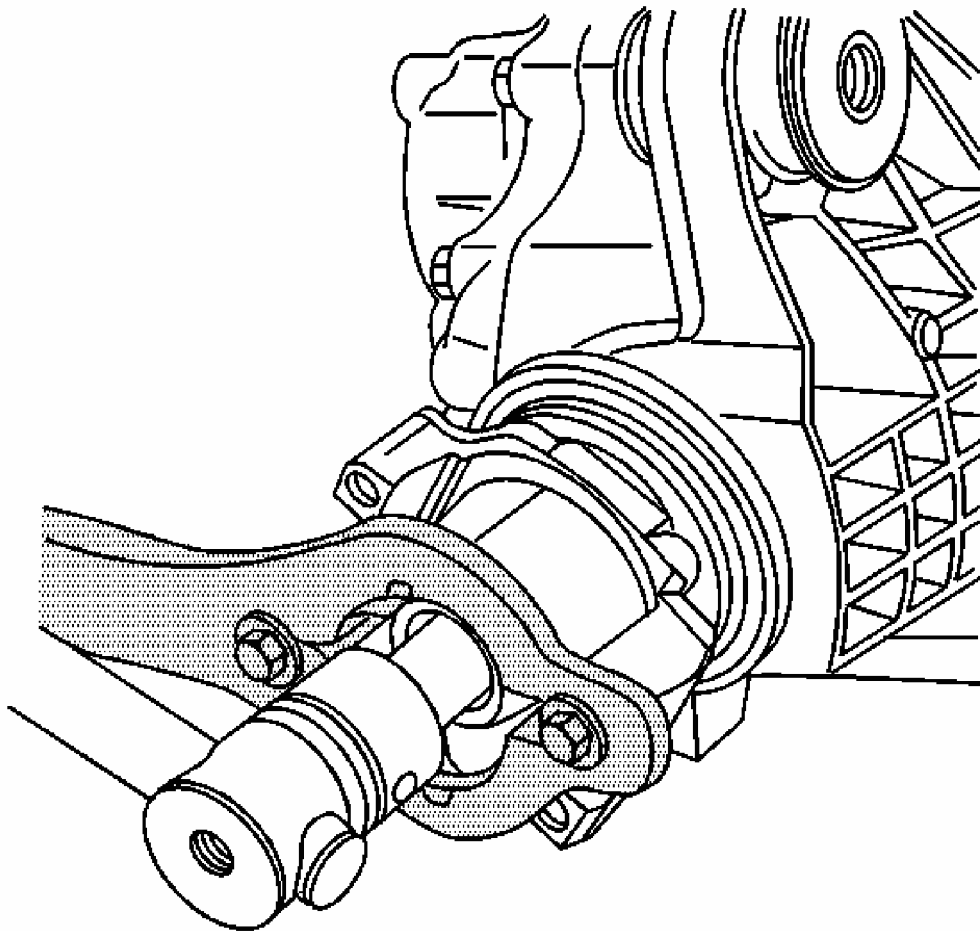


Fig. 88: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

13. Install the **J 8614-01** onto the pinion as shown.
14. Remove the pinion nut while holding the **J 8614-01** .

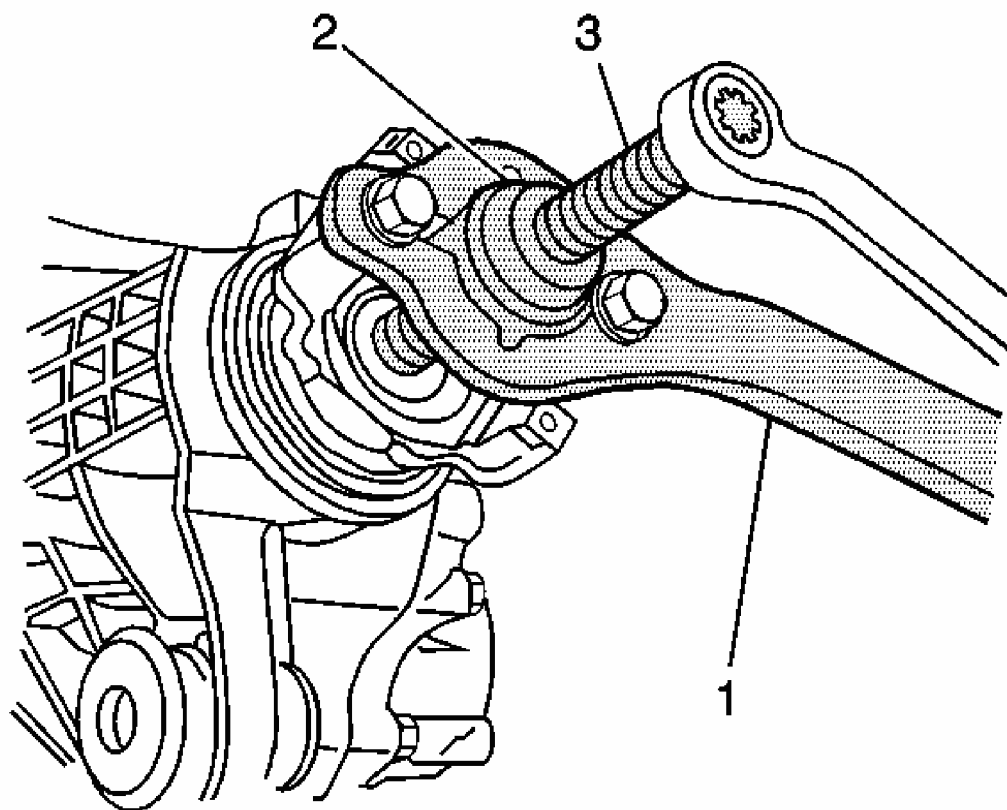


Fig. 89: Removing Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

15. Install the **J 8614-2** (2) and the **J 8614-3** (3) into the **J 8614-01** (1) as shown.
16. Remove the pinion yoke by turning the **J 8614-3** (3) clockwise while holding the **J 8614-01** (1).

IMPORTANT: Carefully pry the seal from the bore. Do not distort or scratch the aluminum case.

17. Remove the oil seal using a flat-bladed tool.
18. Remove the dust deflector from the pinion yoke by doing the following:
 - Tap the deflector off the pinion yoke.
 - Clean up the stake points on the pinion yoke.

Installation Procedure

IMPORTANT: Stake the new deflector at 3 new equally spaced positions.

You must stake the new deflector in such a way that you do not damage the seal operating surface.

1. Install the new deflector and stake the dust deflector onto the pinion yoke.

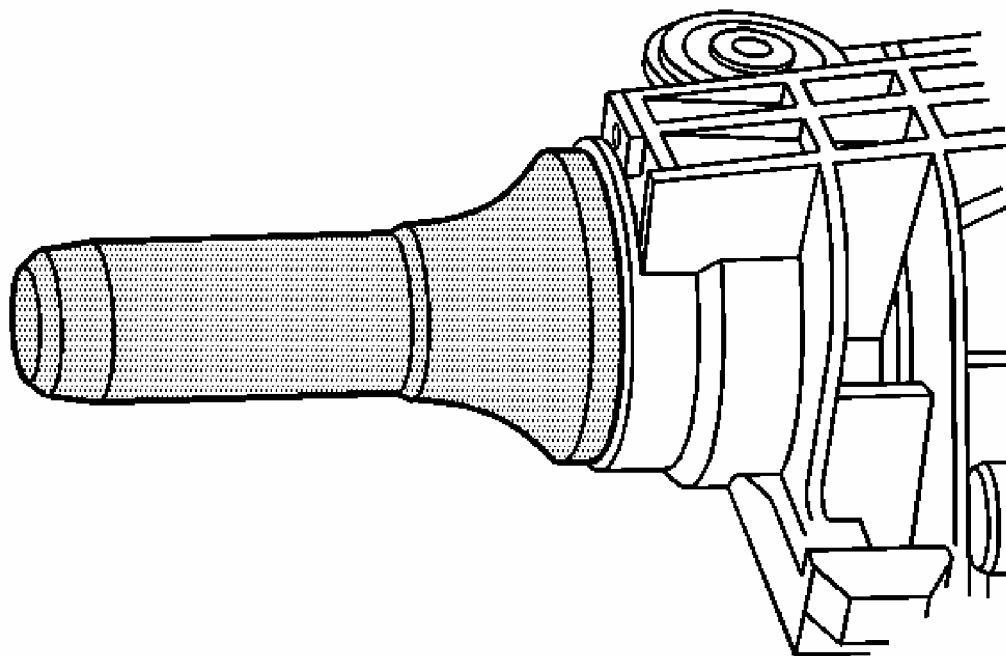


Fig. 90: Installing Oil Seal Using J 36366
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Drive the seal in straight, not at an angle, as this will damage the aluminum housing.

2. Install the oil seal by doing the following:
 - A. Position the oil seal in the bore.
 - B. Install the **J 33782** over the oil seal.
 - C. Strike the **J 33782** with a hammer until the seal flange seats on the axle housing surface.
3. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the drive pinion yoke.
4. Install the pinion yoke.

Align the reference marks made during removal.

NOTE: Do not hammer the pinion flange/yoke onto the pinion shaft. Pinion components may be damaged if the pinion flange/yoke is hammered onto the pinion shaft.

5. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
6. Install the washer and a new pinion nut.

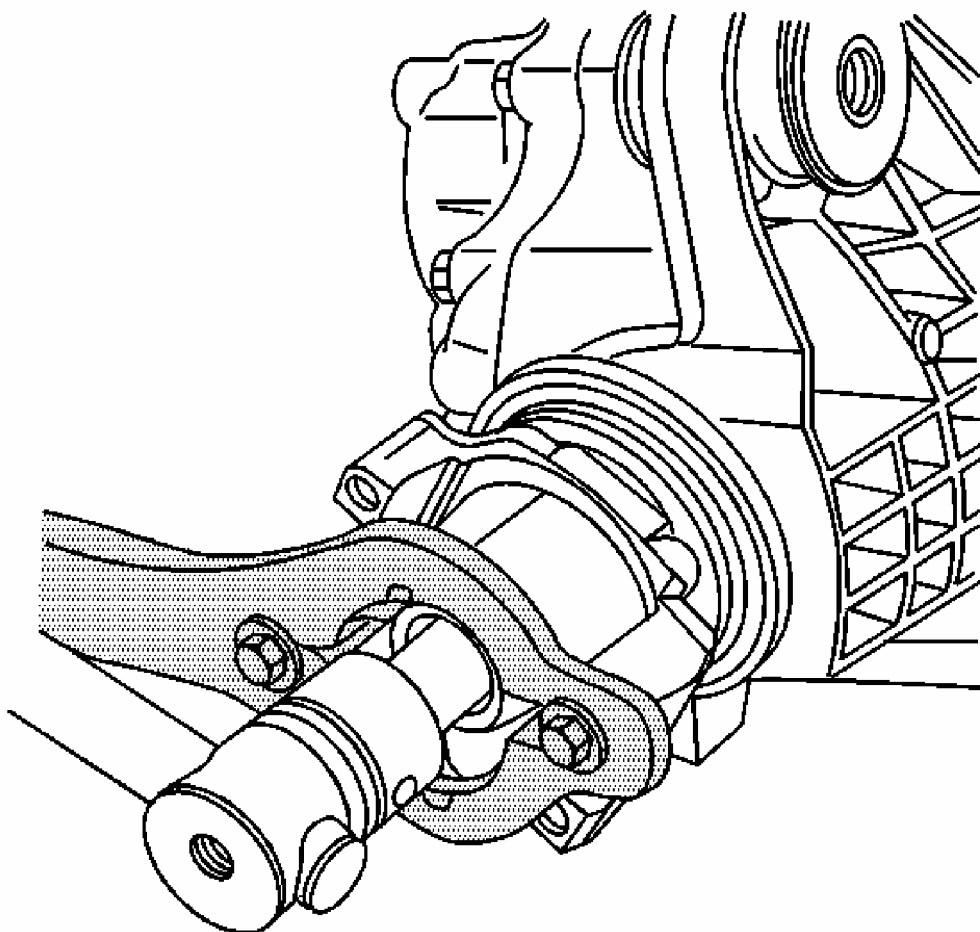


Fig. 91: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

7. Install the J 8614-01 onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

8. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

9. Measure the rotating torque of the pinion. Compare the measurement with the rotating torque recorded earlier.

Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is 0.40-0.57 N.m (3-5 lb in) greater than the torque recorded during removal.

10. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.

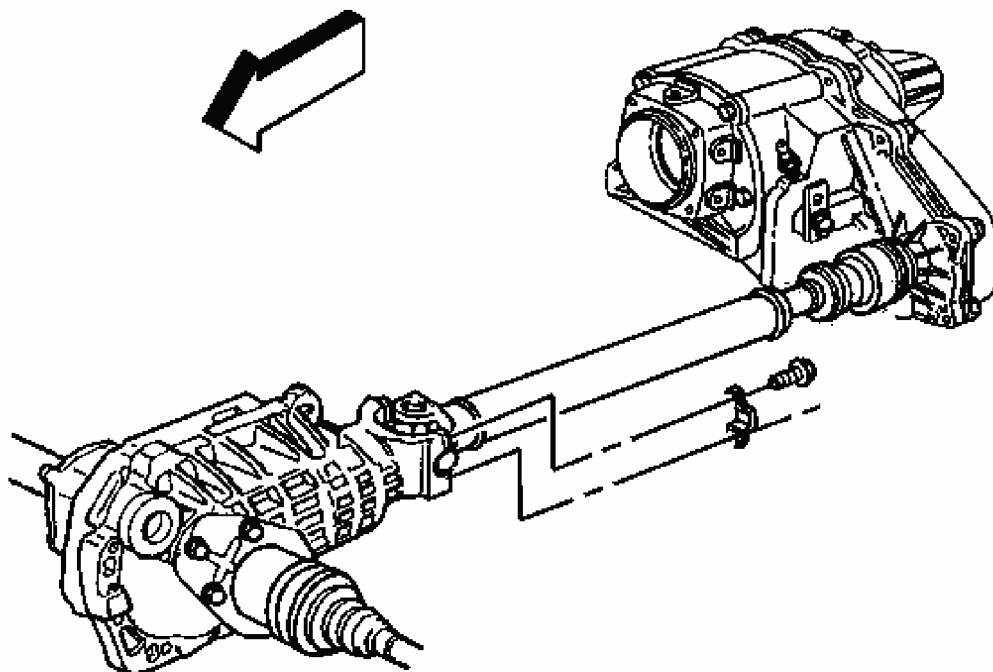


Fig. 92: View Of Front Axle Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

11. Install the propeller shaft to the pinion yoke.

Align the reference marks made during removal.

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2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

12. Install the yoke retainers and the yoke retainer bolts to the pinion yoke.

Tighten: Tighten the yoke retainer bolts to 20 N.m (15 lb ft).

13. Inspect the axle lubricant level, and add, if necessary. Refer to **Lubricant Level Inspection - Front Drive Axle**.

14. Install the brake rotors.

15. Install the brake calipers. Refer to **Brake Caliper Replacement - Front (Dual Piston)** in Disc Brakes.

16. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

17. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY BUSHING REPLACEMENT

Tools Required

J 33791 Bushing Remover/Installer. See **Special Tools and Equipment**.

Removal Procedure

1. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement**.

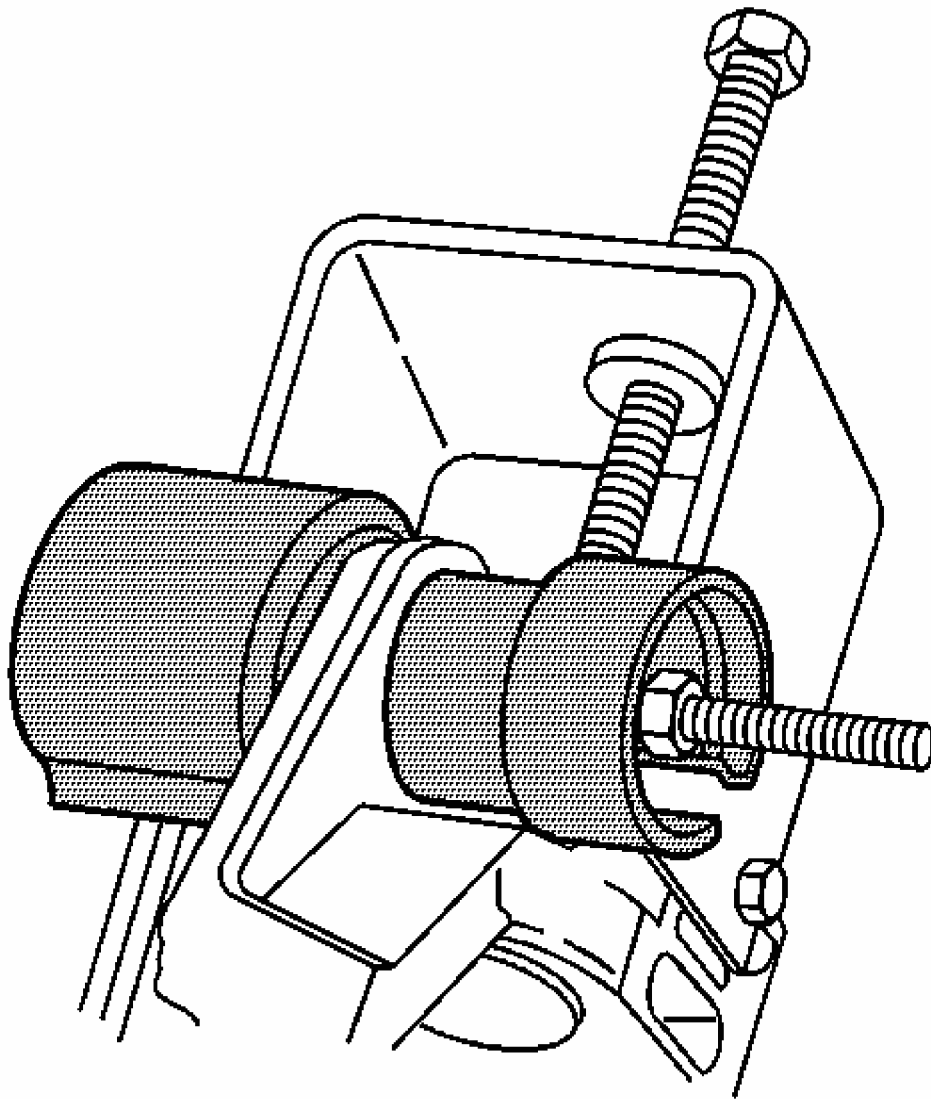


Fig. 93: Removing Carrier Bushing
Courtesy of GENERAL MOTORS CORP.

2. Remove the carrier bushing using the J 33791 .

Installation Procedure

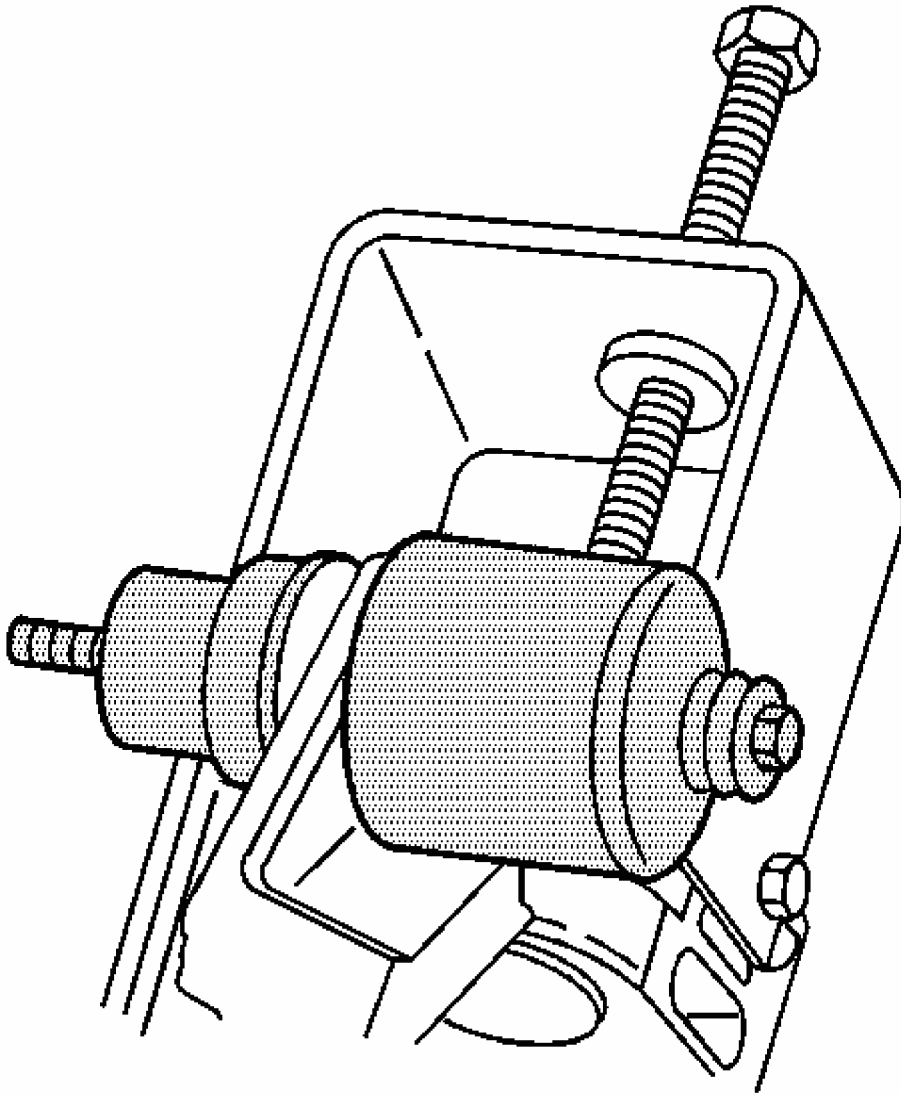


Fig. 94: Installing Carrier Bushing
Courtesy of GENERAL MOTORS CORP.

1. Install the carrier bushing using the **J 33791** .
2. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement**.

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT

Removal Procedure

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1. Unlock the steering column so the steering linkage is free to move.
2. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
3. Place jack stands or utility stands, such as GMDE 123-B67313, at the rear end of the vehicle.
4. Remove the front tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Remove the steering linkage shield. Refer to **Steering Linkage Shield Replacement** in Steering Linkage.
6. Remove the differential carrier shield, if equipped. Refer to **Shield Replacement**.
7. Drain the front drive axle. Refer to **Lubricant Replacement - Front Drive Axle**.
8. Remove the lower part of shock absorber bolt and nut. Refer to **Shock Absorber Replacement (RWD)** or **Shock Absorber Replacement (4WD)** in Front Suspension.
9. Remove the wheel drive shafts. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
10. Remove the front propeller shaft. Refer to **Propeller Shaft Replacement - Front**.
11. Remove the steering relay rod from the idler and pitman arms. Refer to **Relay Rod Replacement (RWD)** or **Relay Rod Replacement (4WD)** in Steering Linkage.
12. Disconnect the electrical connector from the four-wheel drive indicator switch.
13. Disconnect the clutch cable from the differential carrier assembly. Refer to **Clutch Cable Replacement - Front Drive Axle**.
14. Disconnect the vent hose from the differential carrier assembly.
15. Attach a transmission jack to the differential carrier assembly.

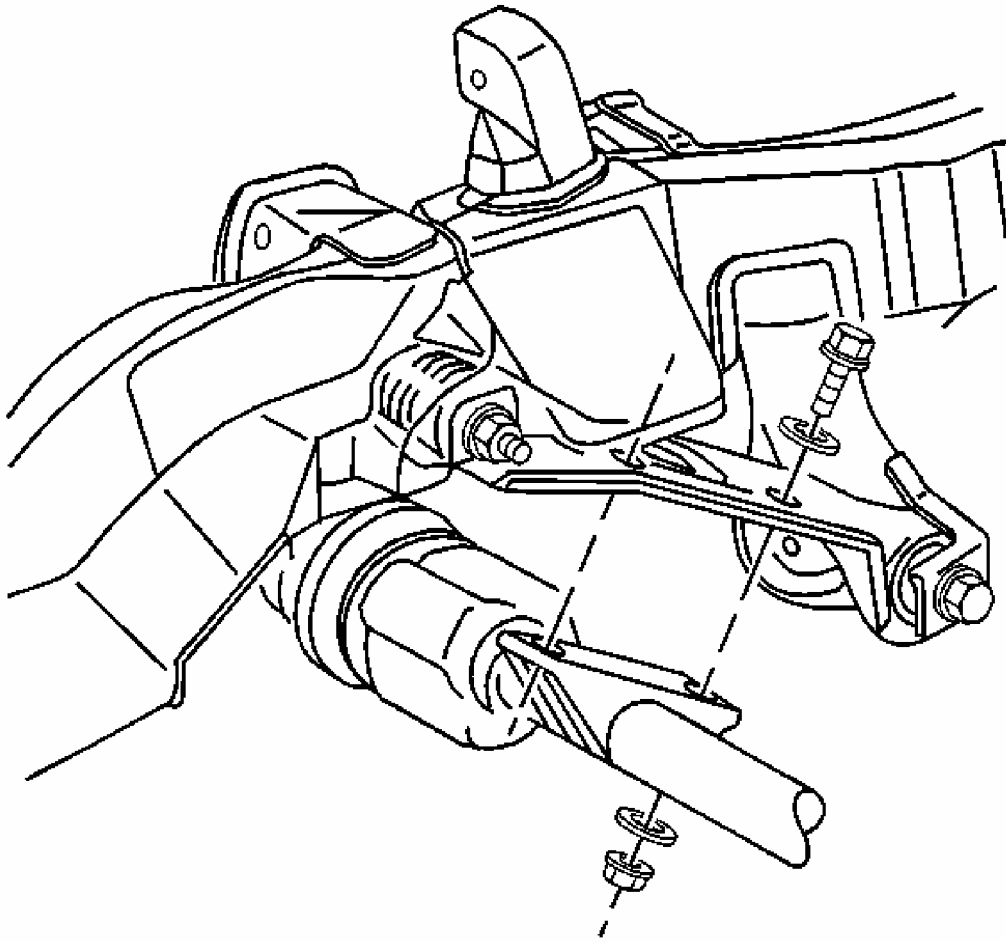


Fig. 95: View Of Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

16. Remove the inner axle shaft housing to frame bracket bolts, nuts and washers.

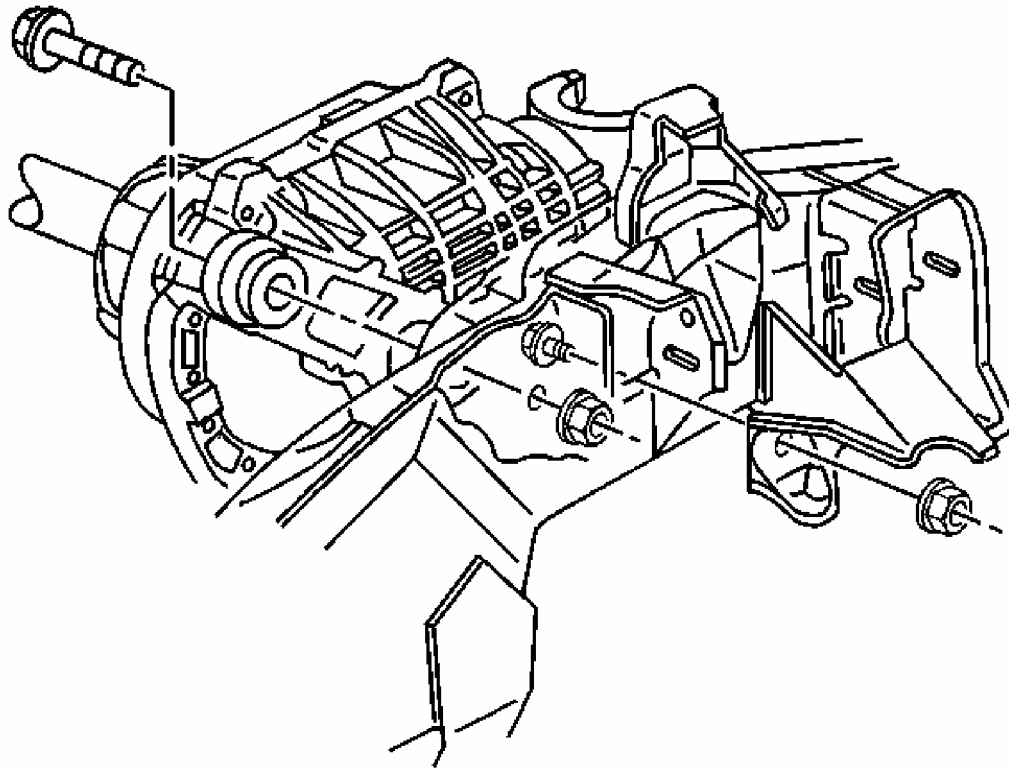


Fig. 96: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

17. Remove the lower differential carrier assembly mounting bolt and the nut.
18. Remove the upper differential carrier assembly mounting bolt and the nut.
19. Remove the differential carrier assembly by rolling the carrier counterclockwise while lifting up to gain clearance from the mounting ears.

Installation Procedure

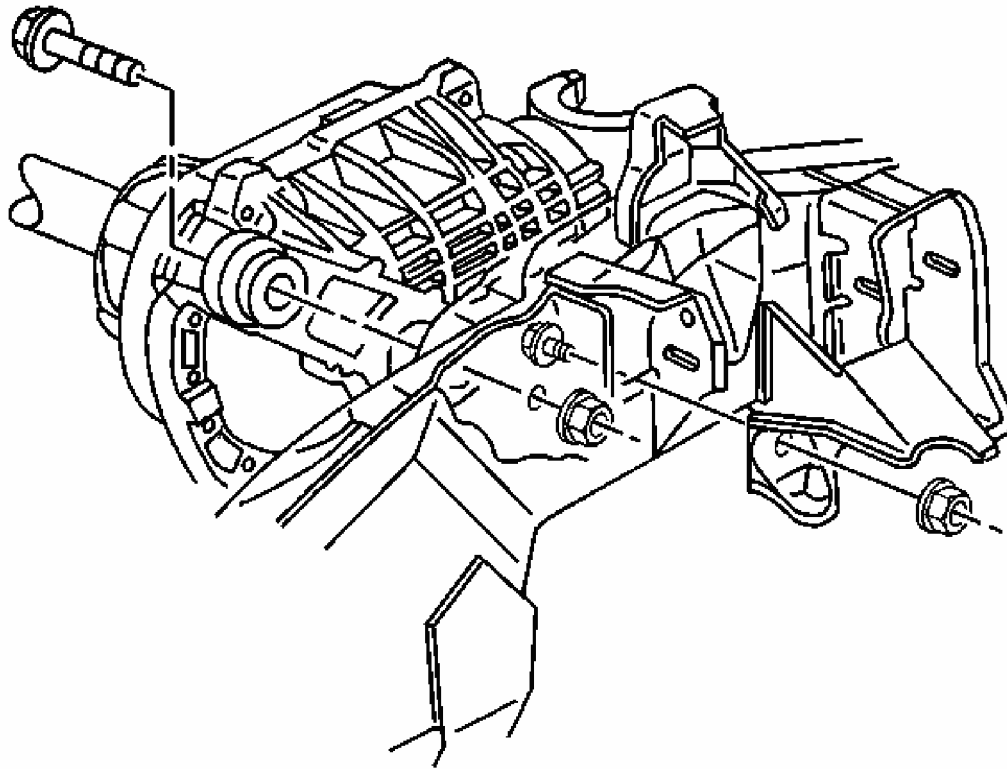


Fig. 97: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the differential carrier assembly to the vehicle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the upper differential carrier assembly mounting bolt, the washer, and the nut.
Install the lower differential carrier assembly mounting bolt, the washer, and the nut.

Tighten: Tighten the differential carrier assembly bolts to 103 N.m (76 lb ft).

3. Install the inner axle housing to frame bolts, the washers, and the nuts.

Tighten: Tighten the inner axle housing nuts to 98 N.m (72 lb ft).

4. Install the clutch cable to the differential carrier assembly. Refer to **Clutch Cable Replacement - Front Drive Axle**.

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5. Connect the vent hose to the differential carrier assembly.
6. Install the electrical connector to the four-wheel drive indicator switch.
7. Install the relay arm to the idler and pitman arms. Refer to **Relay Rod Replacement (RWD)** or **Relay Rod Replacement (4WD)** in Steering Linkage.
8. Install the front propeller shaft. Refer to **Propeller Shaft Replacement - Front**.
9. Install the wheel drive shafts. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
10. Install the lower part of shock absorber bolt and nut. Refer to **Shock Absorber Replacement (RWD)** or **Shock Absorber Replacement (4WD)** in Front Suspension.
11. Inspect the axle lubricant level and add, if necessary. Refer to **Lubricant Level Inspection - Front Drive Axle**.
12. Install the steering linkage shield. Refer to **Steering Linkage Shield Replacement** in Steering Linkage.
13. Install the differential shield, if equipped. Refer to **Shield Replacement**.
14. Install the front tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
15. Remove the jack stands or utility stands.
16. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY - DISASSEMBLE

Inspection Procedure

Perform the following before disassembling the axle:

1. Remove the drain plug from the axle.
2. Drain the axle lubricant.
3. Inspect the oil and the case for metal chips.

Determine the source of the metal chips, such as a broken gear or bearing cage.

4. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

This information can be used in order to determine the cause of the axle problem. The information will also help when setting up and preloading the differential case.

Determine the cause of the axle problem before disassembly, if possible.

Disassembly Procedure

Tools Required

2004 Chevrolet S10 Pickup

2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma

- **J 21551** Output Shaft Bearing Remover. See Special Tools and Equipment.
- **J 22912-01** Pinion Bearing Remover. See Special Tools and Equipment.
- **J 23907** Slide Hammer. See Special Tools and Equipment.
- **J 29369-1** Bushing/Bearing Remover. See Special Tools and Equipment.
- **J 29369-2** Bushing/Bearing Remover (2-3 inches). See Special Tools and Equipment.
- **J 33791** Bushing Remover and Installer Set. See Special Tools and Equipment.
- **J 33792** Side Bearing Adjuster Socket. See Special Tools and Equipment.
- **J 33837** Pinion Bearing Cup Remover and Installer. See Special Tools and Equipment.
- **J 34011** Pilot Bearing Remover. See Special Tools and Equipment.
- **J 36611** Output Shaft Bearing Remover. See Special Tools and Equipment.
- **J 42213** Side Bearing Adjuster Socket. See Special Tools and Equipment.
- **J 8092** Driver Handle
- **J 8614-01** Pinion Flange Holder. See Special Tools and Equipment.

1. Remove the 2 remaining inner axle shaft housing bolts.
2. Remove the inner axle shaft housing with the inner axle shaft.
3. Remove the following components from the inner axle shaft housing:
 - A. The clutch cable retainer spring
 - B. The clutch fork assembly
 - C. The clutch fork inner spring
 - D. The clutch fork sleeve
 - E. The thrust washer
 - F. The clutch gear by doing the following:

1. Clamp the inner shaft housing in a vise.

Clamp only on the mounting flange.

2. Strike the inside surface of the axle shaft with a hammer and a brass drift in order to dislodge the front drive axle clutch gear from the inner axle shaft.
 3. Remove the front drive axle clutch gear.
 - G. Remove the thrust washer.
4. Remove the inner axle shaft.
5. Remove the clutch fork seal.

Use a punch to drive out the seal.

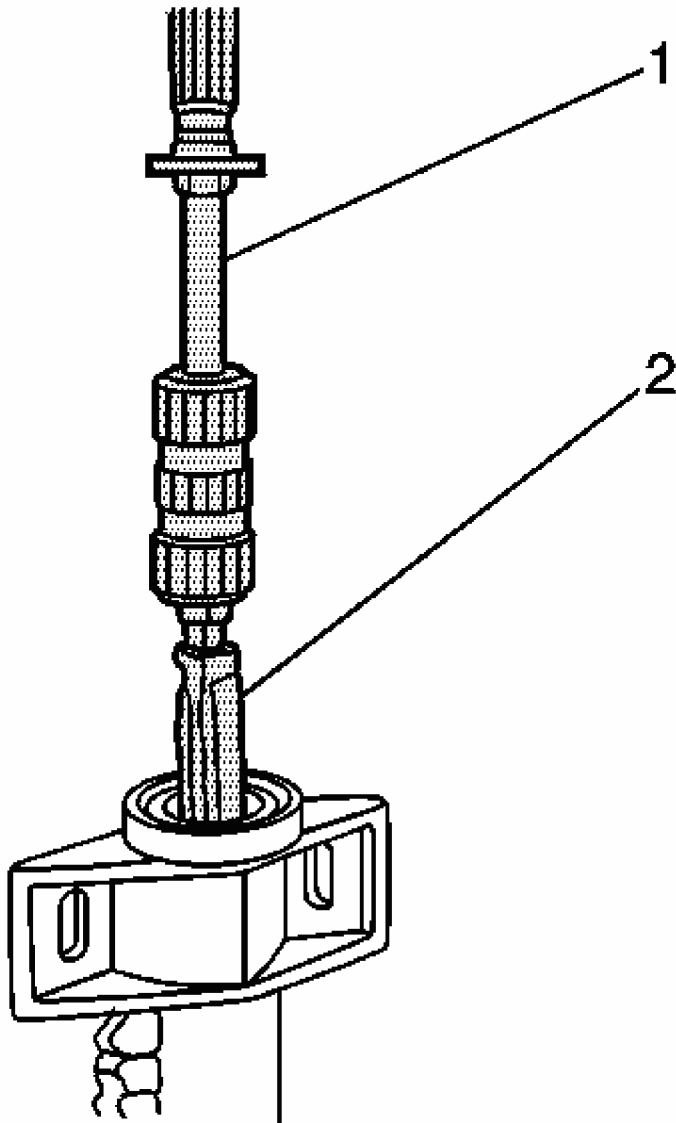


Fig. 98: Removing Inner Axle Shaft Bearing & Seal
Courtesy of GENERAL MOTORS CORP.

6. Remove the inner axle shaft seal and the bearing by doing the following:
 - A. Install the **J 23907** (1) and the **J 29369-1** (2) as shown.
 - B. Remove the inner axle shaft seal and the bearing by pulling on the **J 23907** (1).
7. Remove the front drive axle clutch shaft.
8. Remove the thrust washer from the right side differential carrier assembly case half.

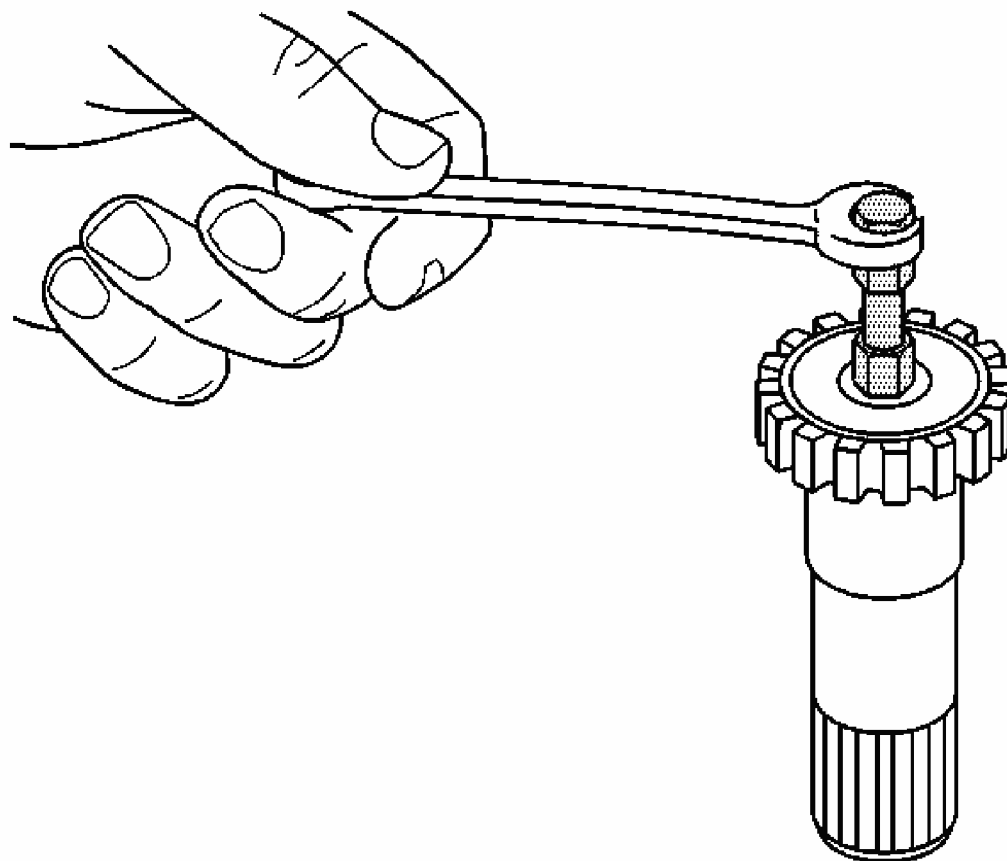


Fig. 99: Removing Clutch Shaft Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

9. Remove the clutch shaft bearing using the **J 34011** . See **Special Tools and Equipment**.
10. Remove the inner axle shaft seal cover and the seal.
11. Remove the inner axle shaft seal by doing the following:
 - A. Install the inner axle shaft seal cover in a vise.
 - B. Install the **J 29369-1** to the backside of the inner axle shaft seal.
 - C. Install the **J 23907** to the **J 29369-1** .
 - D. Remove the inner axle shaft seal by pulling on the **J 23907** .
12. Remove the differential carrier assembly bolts.

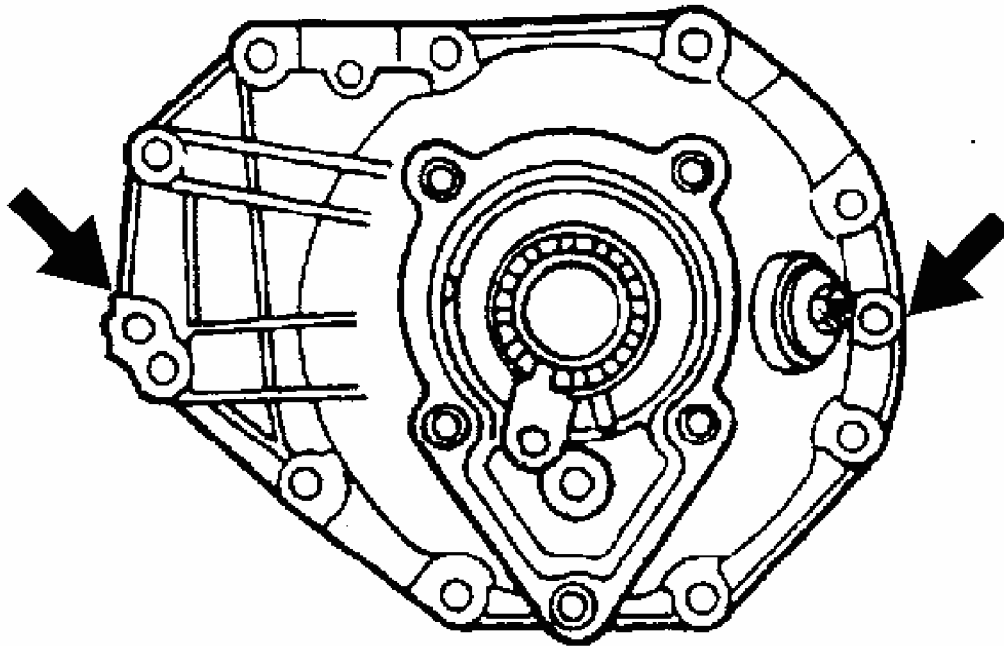


Fig. 100: Separating Left Carrier Case Half From Right Carrier Case Half
Courtesy of GENERAL MOTORS CORP.

13. Separate the left carrier case half from the right carrier case half by inserting a screwdriver into the slots provided and prying the case apart.
14. Remove the differential case assembly.

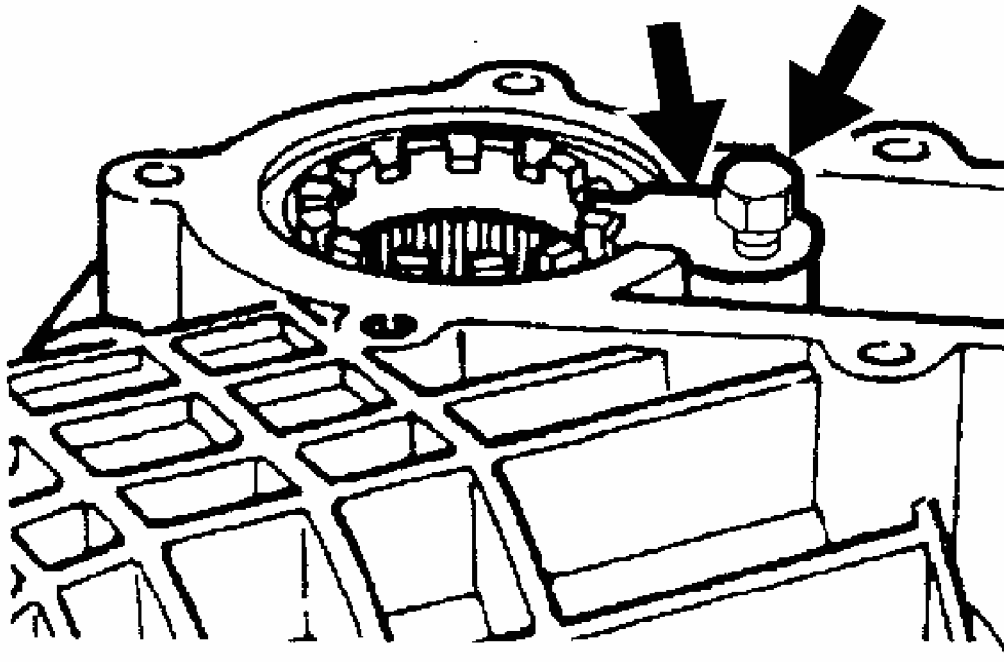


Fig. 101: View Of Differential Adjuster Nut Lock Tab Bolts
Courtesy of GENERAL MOTORS CORP.

15. Remove the differential bearing adjuster nut lock bolts and the differential bearing adjuster nut locks.

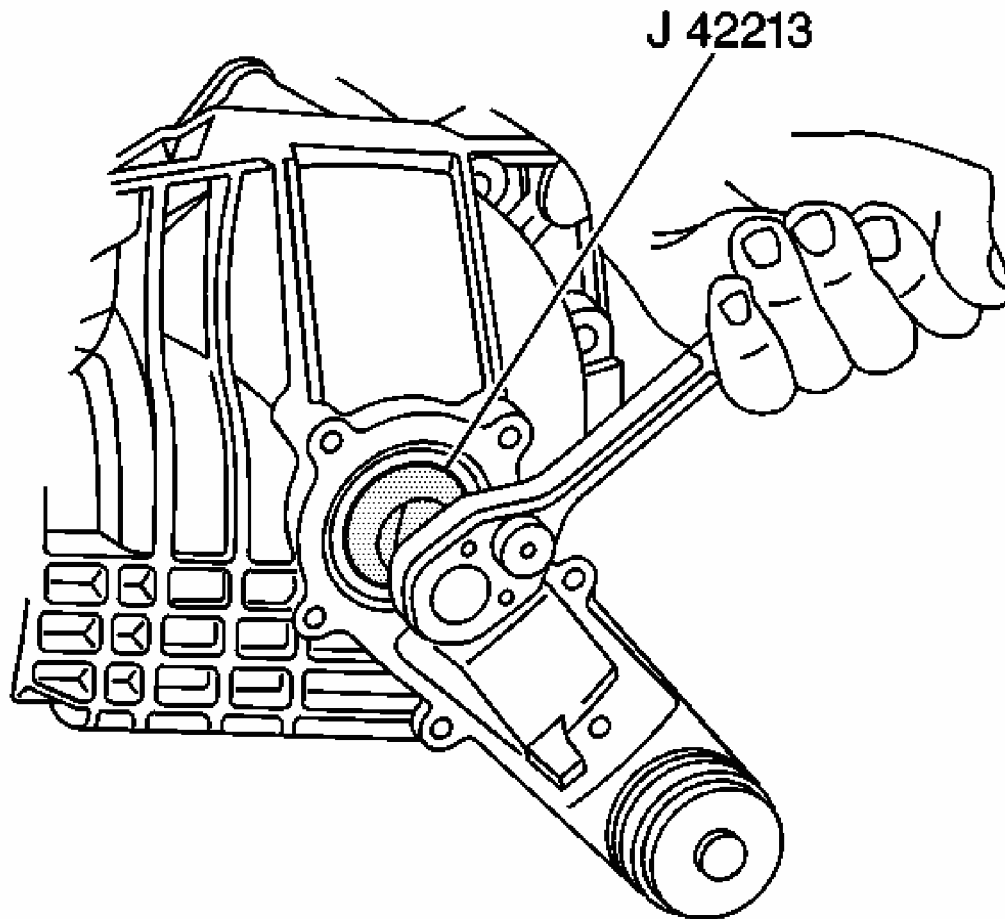


Fig. 102: Removing Left Differential Bearing Adjuster & Differential Case Bearing Cup

Courtesy of GENERAL MOTORS CORP.

16. Remove the left differential bearing adjuster and the differential case bearing cup by doing the following:
 - A. Install the **J 42213** onto the differential bearing adjuster nut.
 - B. Turn the **J 42213** clockwise in order to remove the differential bearing adjuster and the differential case bearing cup out of the bore.

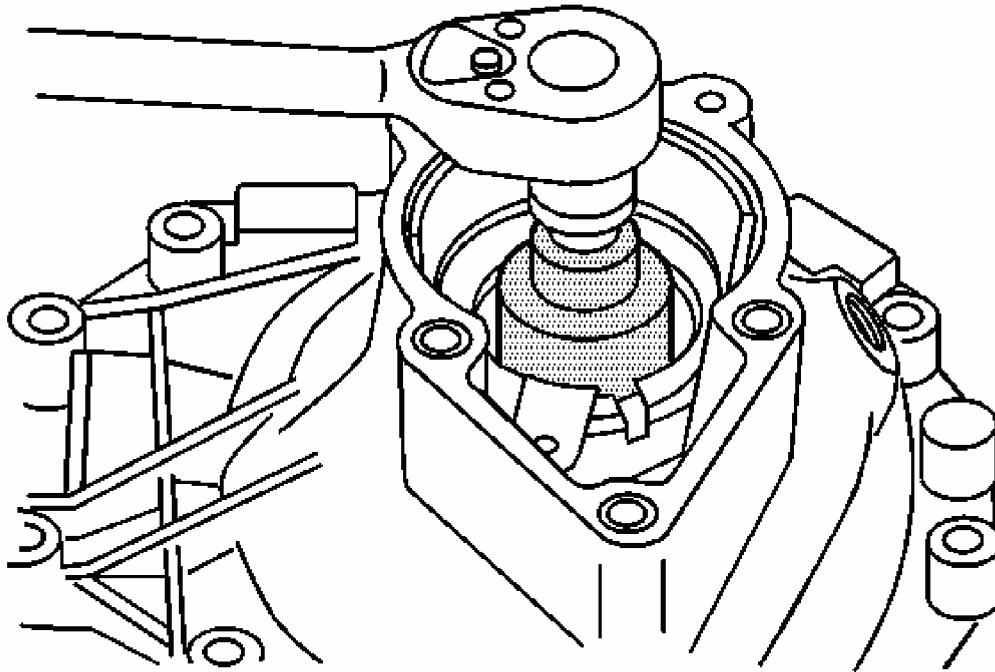


Fig. 103: Removing & Installing Right Differential Bearing Adjuster & Differential Case Bearing Cup
Courtesy of GENERAL MOTORS CORP.

17. Remove the right differential bearing adjuster and the differential case bearing cup by doing the following:
 - A. Install the **J 33792** onto the differential bearing adjuster nut.
 - B. Turn the **J 33792** clockwise in order to remove the differential bearing adjuster and the differential case bearing cup out of the bore.

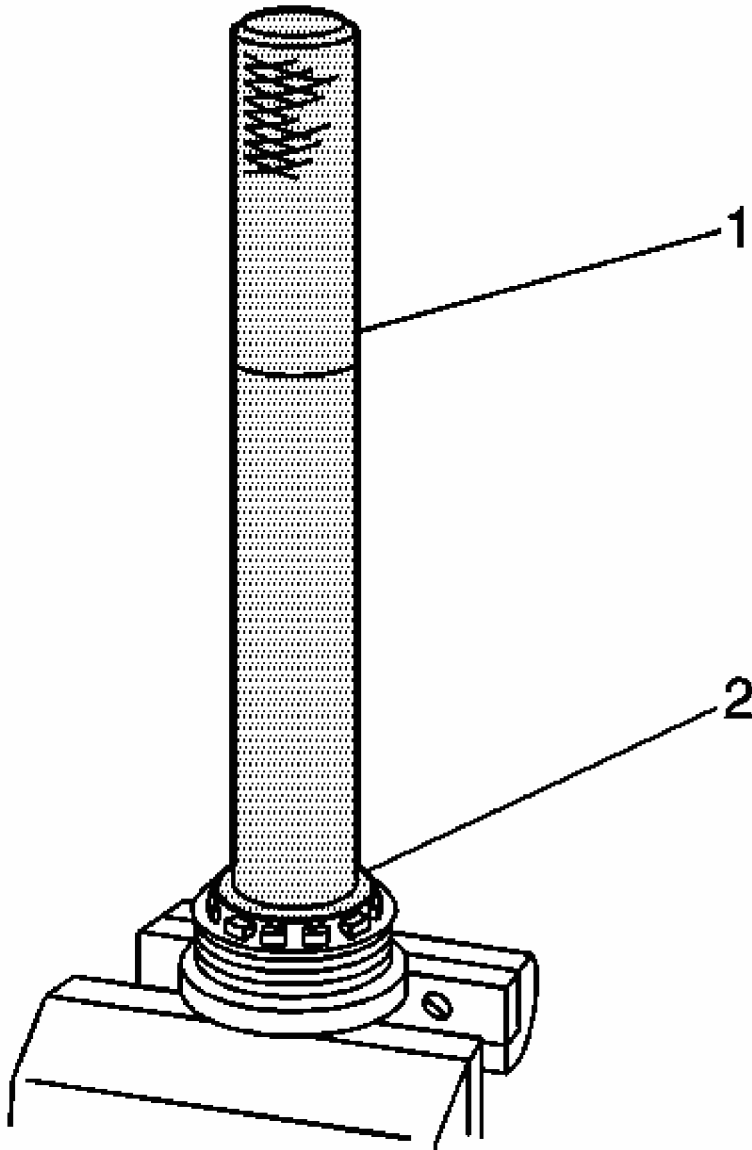


Fig. 104: Removing Left Inner Shaft Bearing
Courtesy of GENERAL MOTORS CORP.

18. Remove the left inner shaft bearing using the **J 36611** (2) and the **J 8092** (1).

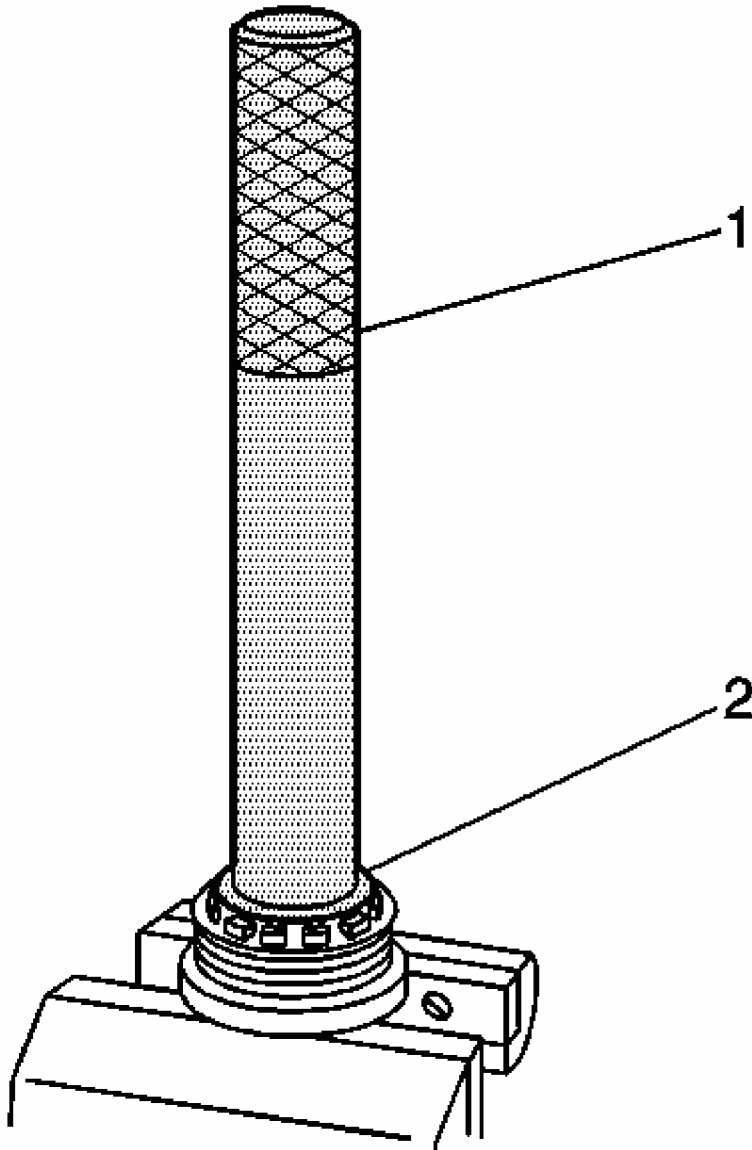


Fig. 105: Removing Right Inner Shaft Bearing
Courtesy of GENERAL MOTORS CORP.

19. Remove the right inner shaft bearing using the **J 21551** (2) and the **J 8092** (1).

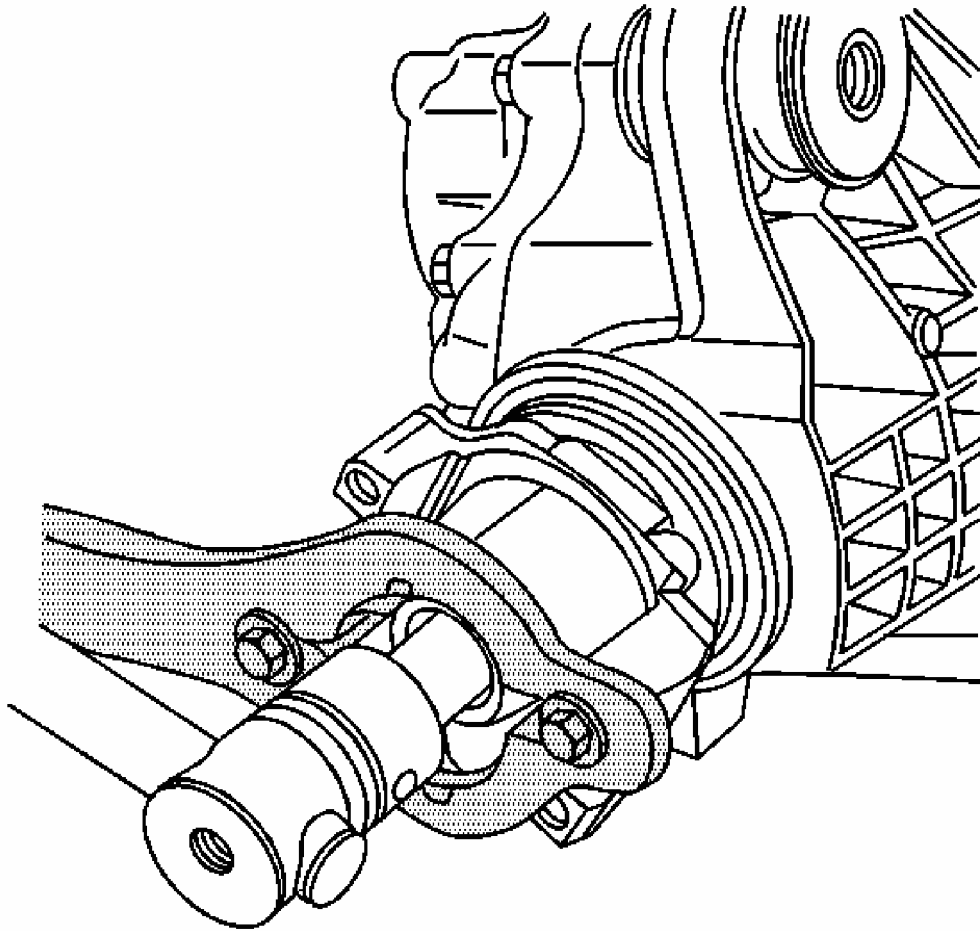


Fig. 106: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

20. Install the **J 8614-01** as shown.

Remove the pinion nut while holding the **J 8614-01** .

21. Remove the washer.

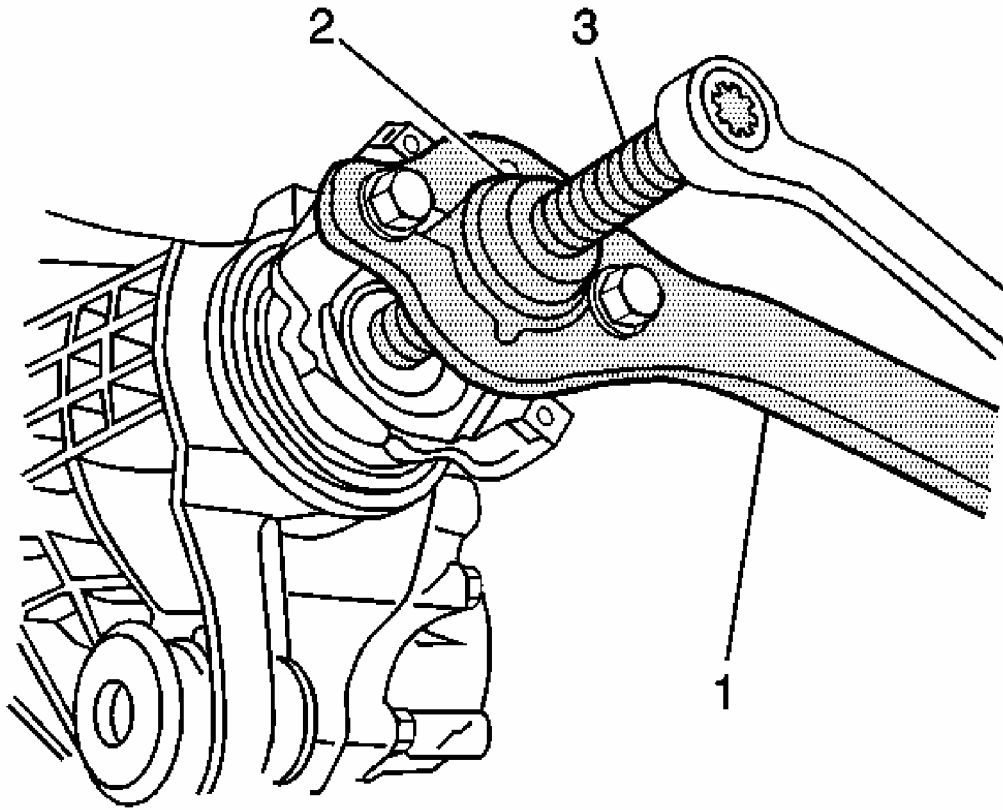


Fig. 107: Removing Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

22. Install the **J 8614-2** (2) and the **J 8614-3** (3) into the **J 8614-01** (1) as shown.
23. Remove the pinion yoke by turning the **J 8614-3** (3) clockwise while holding the **J 8614-01** (1).
24. Remove the dust deflector from the pinion yoke by doing the following:
 - A. Tap the deflector off the pinion yoke.
 - B. Clean up the stake points on the pinion yoke.

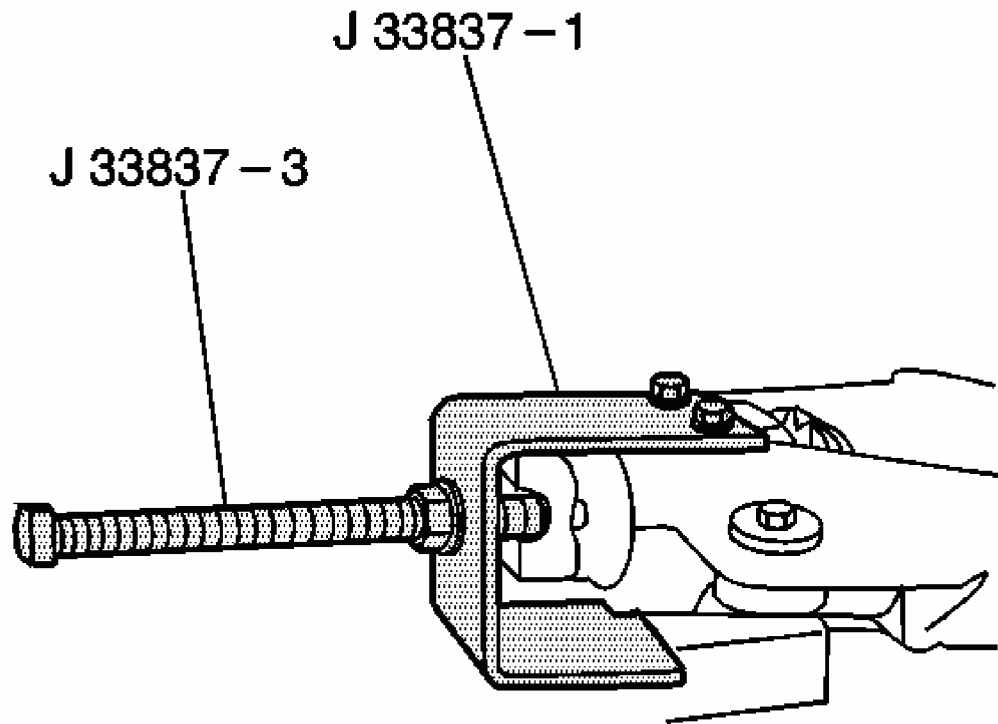


Fig. 108: Mounting Left Side Differential Carrier Case In J 33837-1
Courtesy of GENERAL MOTORS CORP.

25. Mount the left side differential carrier case in the **J 33837-1** .
26. Install the **J 33837-3** .
27. While holding the **J 33837-3** , turn the nut sleeve of the **J 33837-1** counterclockwise to remove the following components:
 - The drive pinion
 - The drive pinion selectable shim
 - The inner pinion bearing
 - The collapsible spacer
28. Remove the collapsible spacer from the pinion.

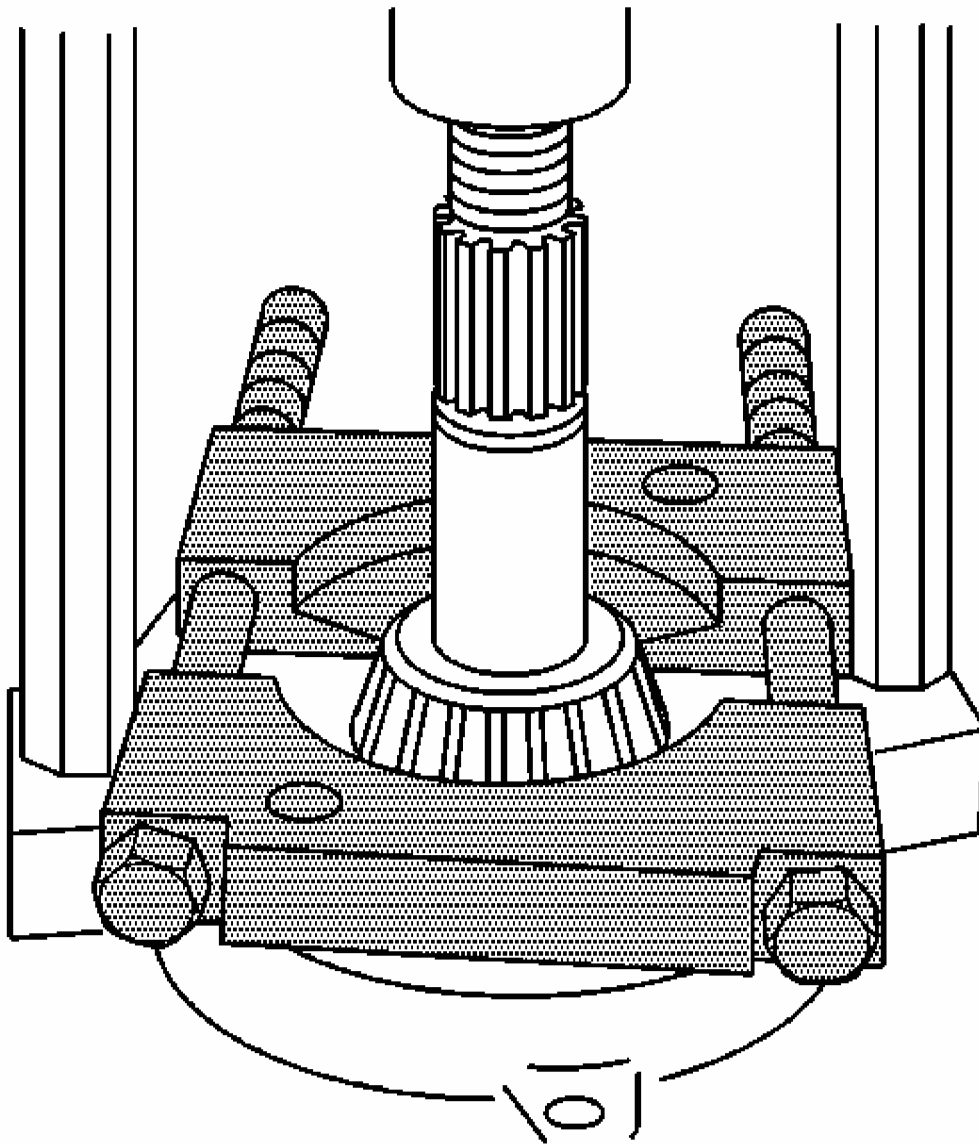


Fig. 109: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

29. Remove the inner pinion bearing by installing the **J 22912-01** between the pinion bearing and the pinion gear and pressing the bearing off the pinion.
30. Remove the pinion gear selectable shim.

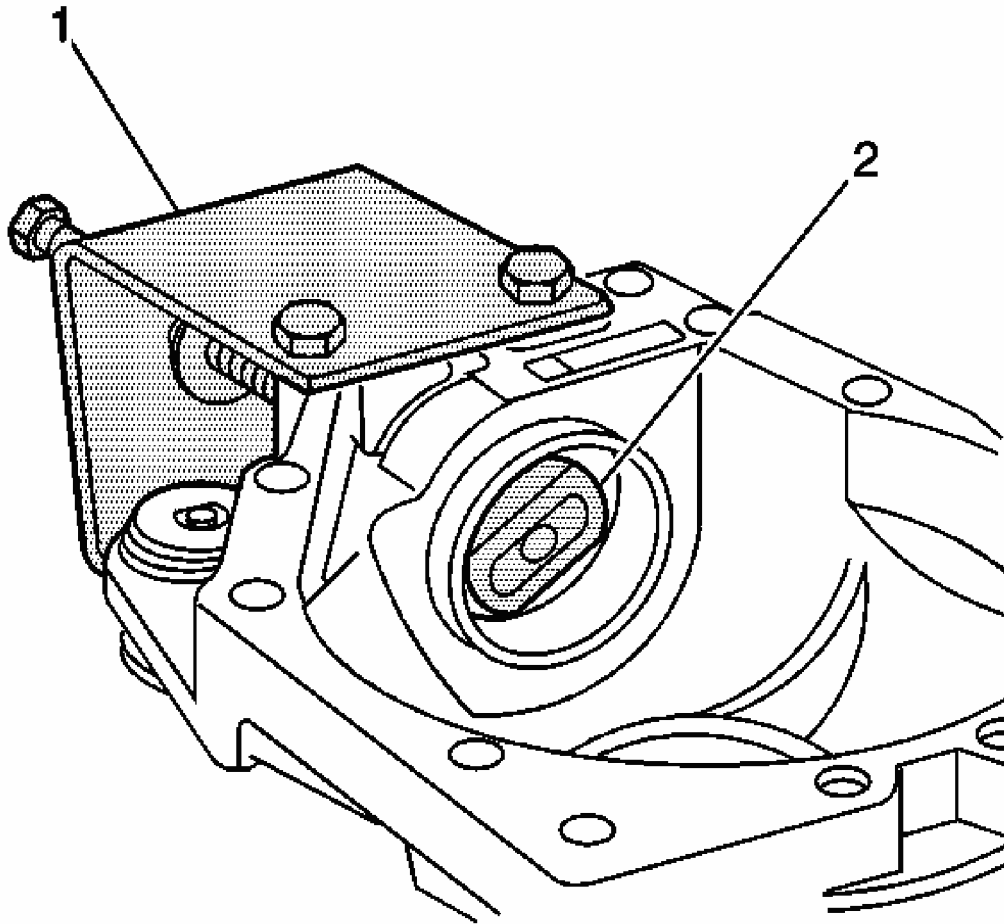


Fig. 110: Installing J 33837-6 Onto J 33837-3 Between Inner & Outer Bearing Cup

Courtesy of GENERAL MOTORS CORP.

31. Install the J 33837-6 (2) onto the J 33837-3 between the inner and the outer bearing cup.
32. While holding the **J 33837-3** , turn the nut sleeve of the **J 33837-1** clockwise in order to remove the following components:
 - The pinion oil seal
 - The pinion outer bearing
 - The pinion outer bearing cup
33. Install the **J 33837-6** (2) onto the **J 33837-3** on the inside surface of the outer bearing cup.
34. While holding the **J 33837-3** , turn the nut sleeve of the **J 33837-1** counterclockwise in

order to press the inner pinion bearing cup out from the differential carrier case.

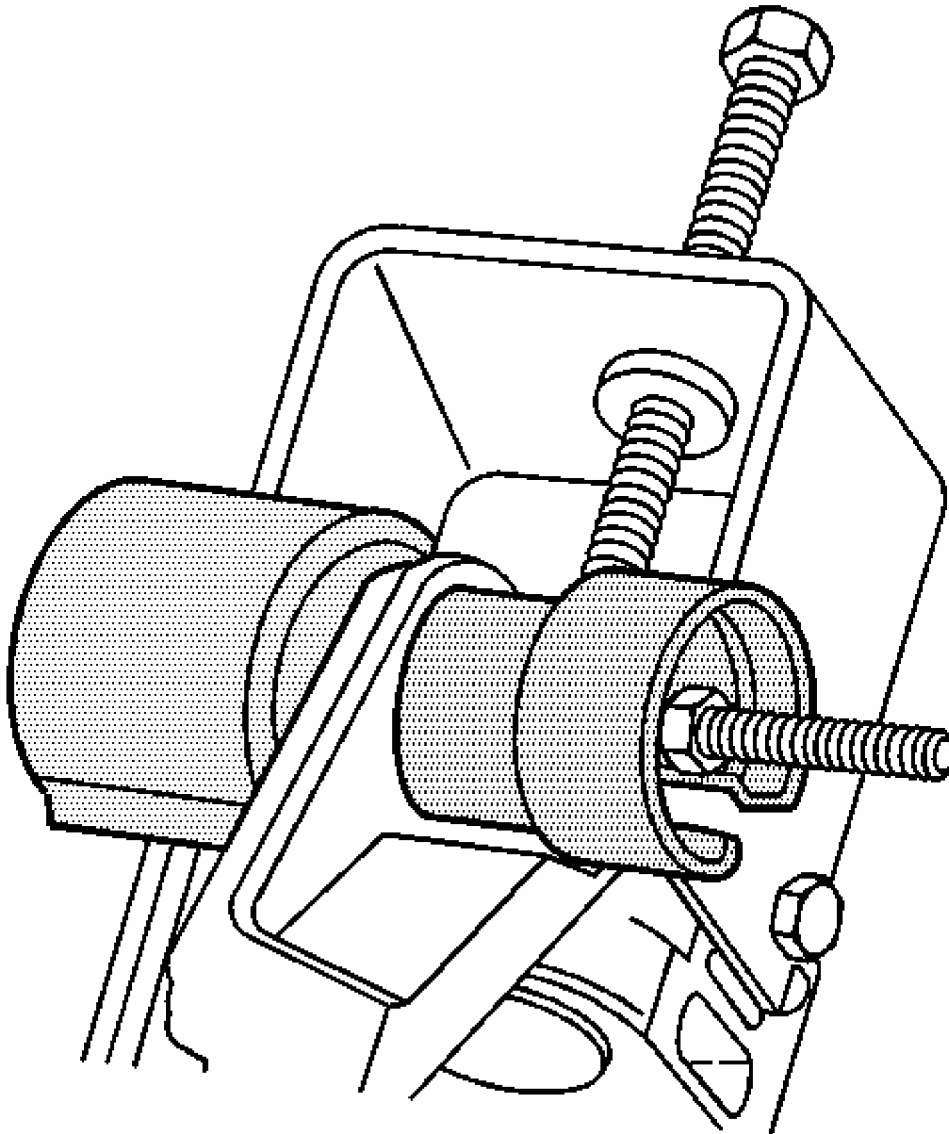


Fig. 111: Installing J 33791 Onto Differential Carrier Assembly Bushings
Courtesy of GENERAL MOTORS CORP.

35. Install the **J 33791** onto the differential carrier assembly bushings.
36. Remove the bushings using the **J 33791** .

Tools Required

J 22888-D Side Bearing Remover Kit

1. Place the differential case in a vise.

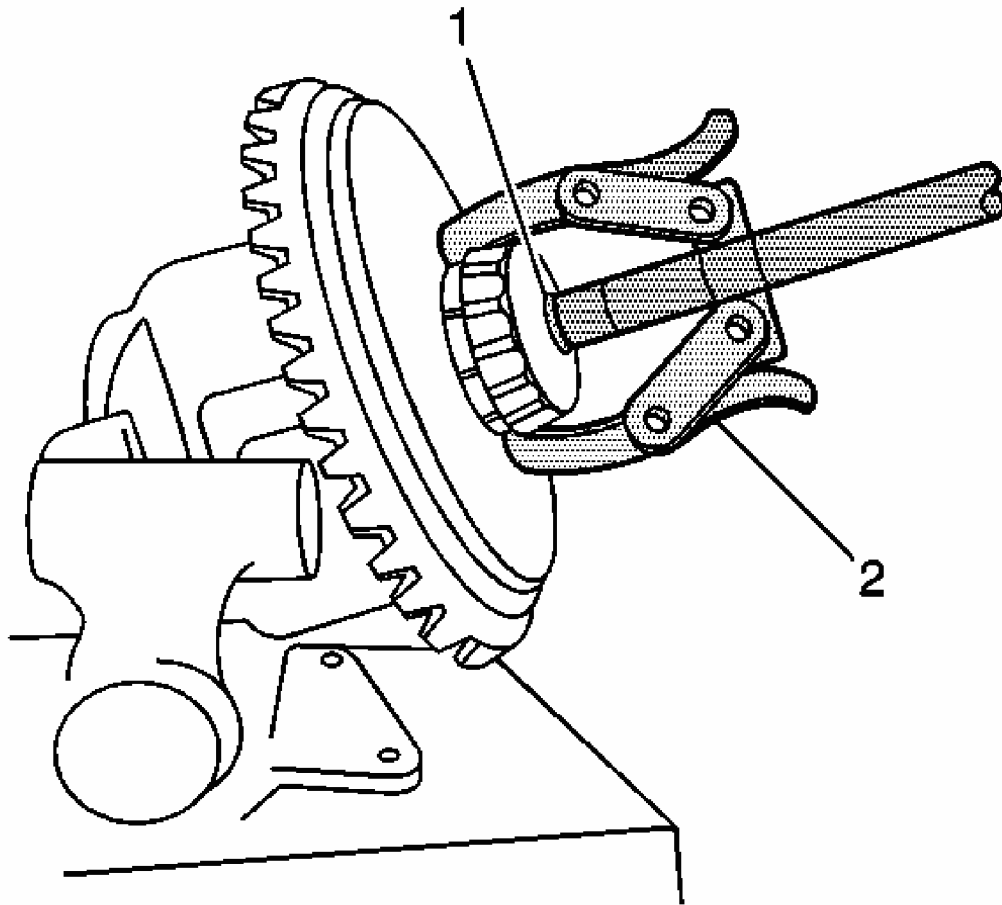


Fig. 112: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the J 22888-20A (2) and the J 8107-2 (1) as shown.
3. Remove the differential side bearings using the J 22888-20A and the J 8107-2 .

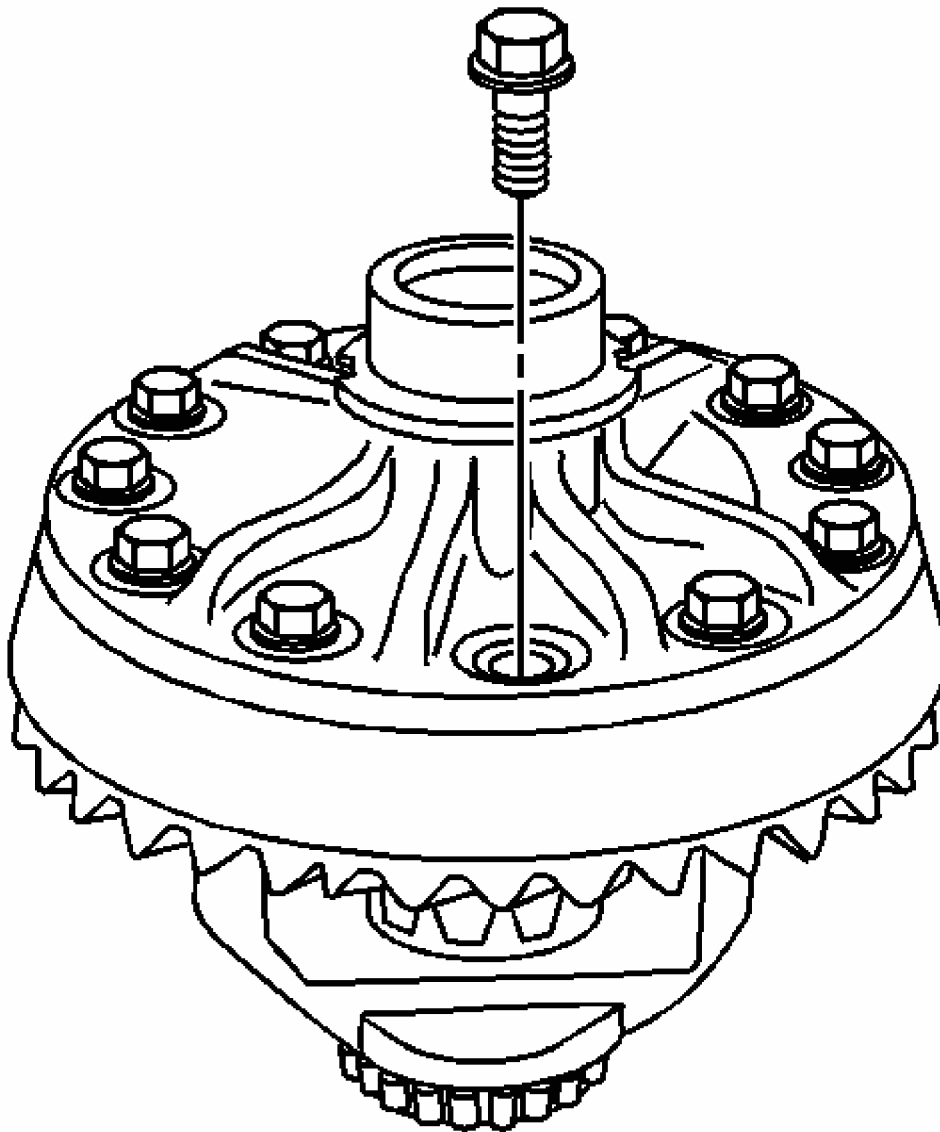


Fig. 113: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-handed threads.

4. Remove the ring gear bolts.

NOTE: Do not pry the ring gear from the differential case. Prying the

ring gear from the differential case may cause damage to the ring gear and/or the differential case.

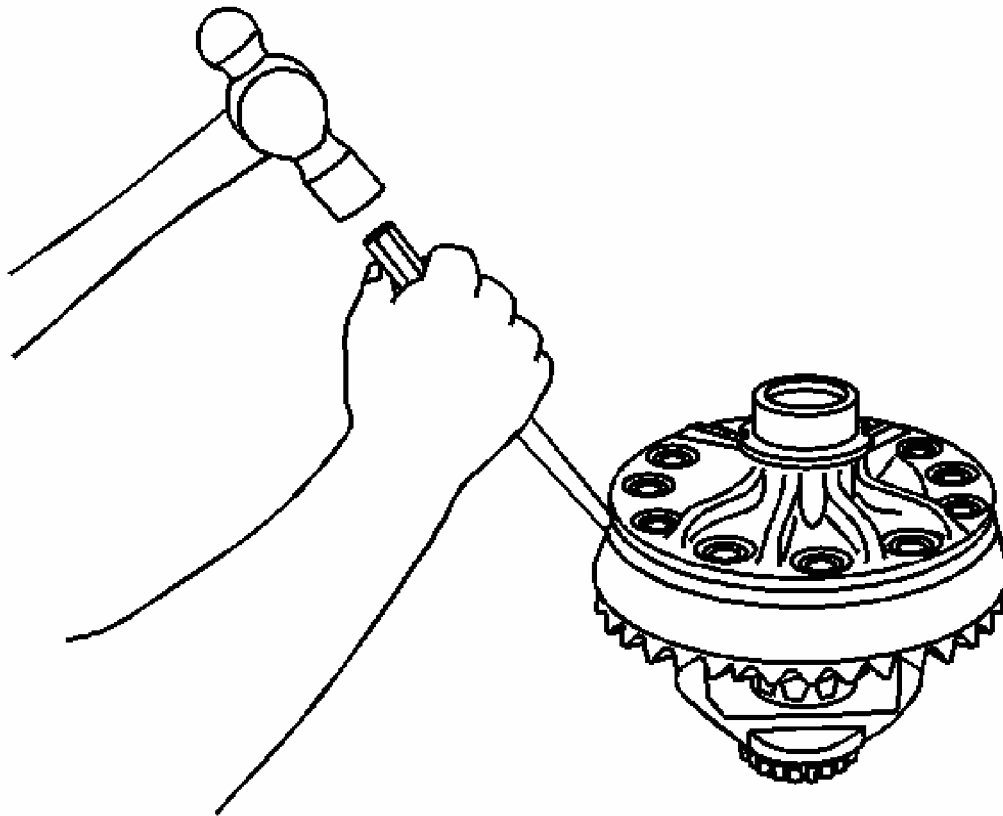


Fig. 114: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

5. Remove the ring gear from the differential case.

Drive the ring gear off with a brass drift if necessary.

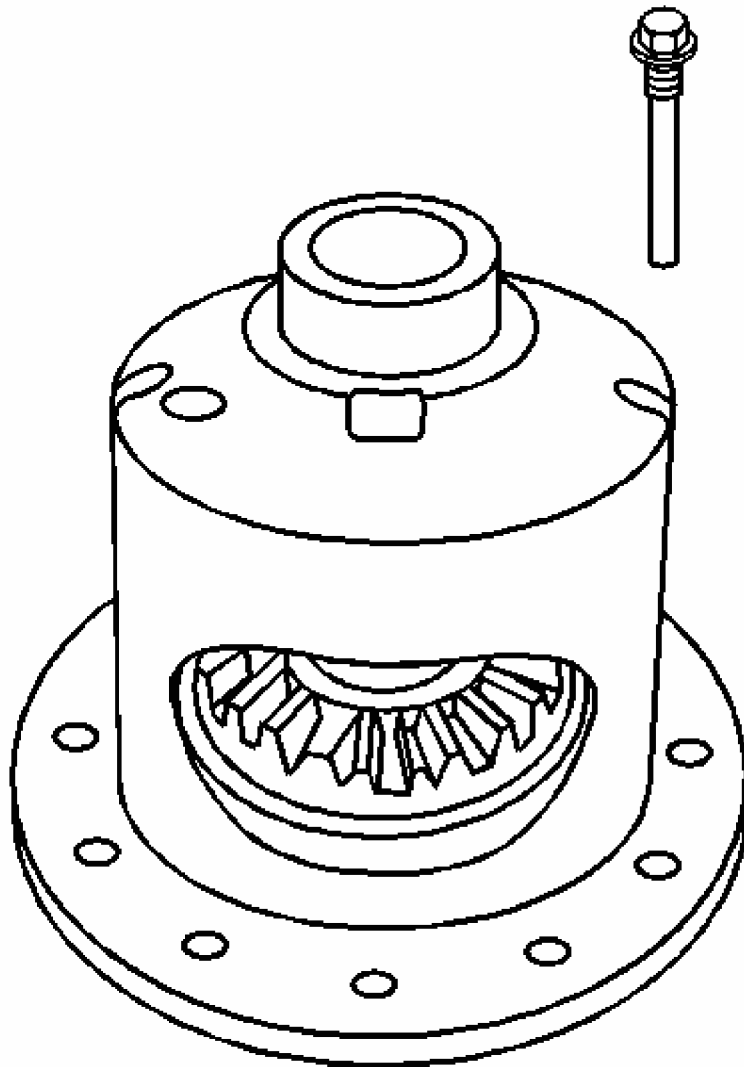


Fig. 115: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion shaft lock bolt.

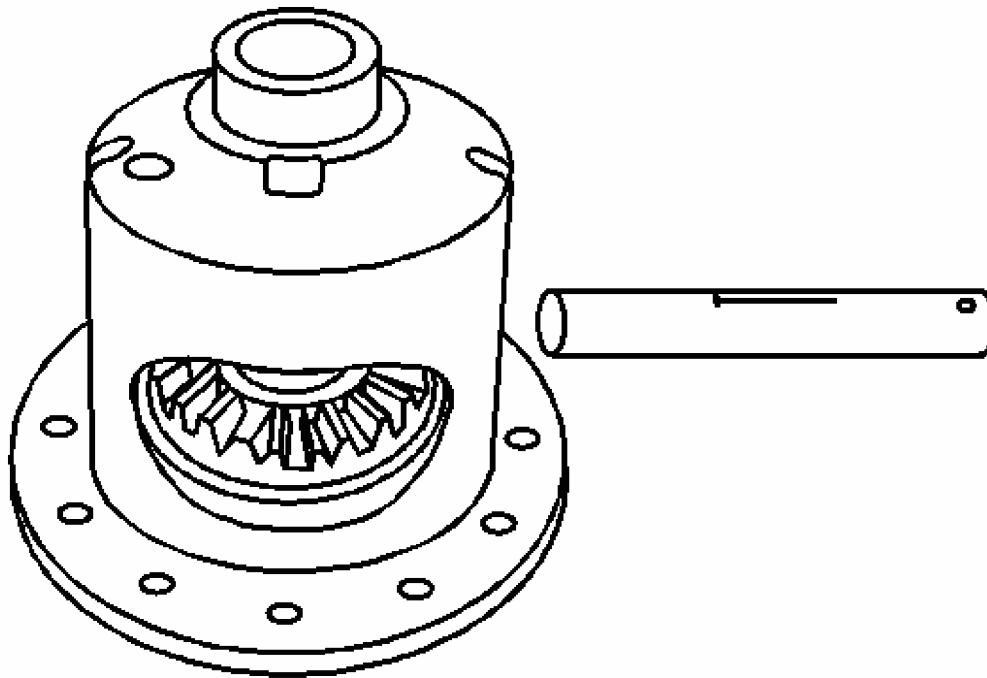


Fig. 116: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Remove the pinion shaft.

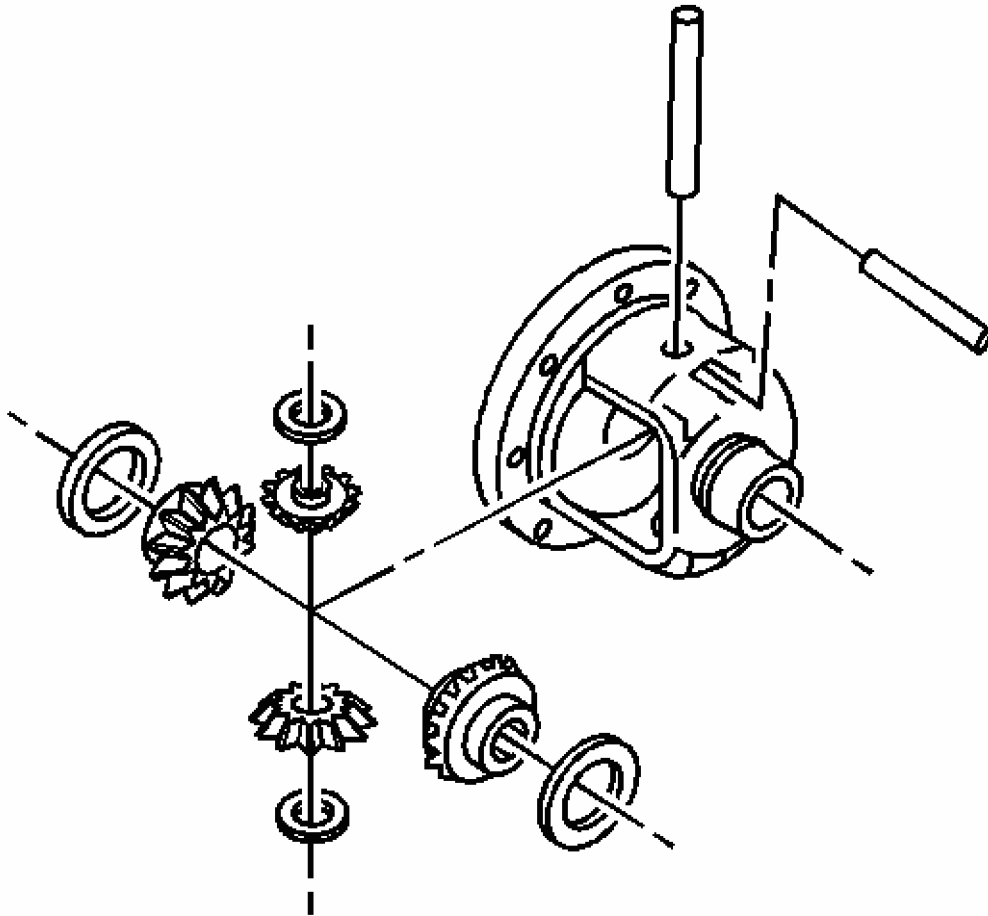


Fig. 117: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

8. Remove the differential pinion gears and the differential side gears.
 - A. Roll the differential pinion gears out of the case with the pinion thrust washers.
 - B. Remove the differential side gears and the side gear thrust washers.

Mark the pinion gears top and bottom and the differential side gears left and right.

DIFFERENTIAL CASE BEARINGS INSPECTION

IMPORTANT:

- When replacing the worn or cracked bearings and the cups, replace the bearings in sets.
- The low mileage bearings may have very small

scratches and pits on the rollers and the bearing cups from the initial preload.

Do not replace a bearing for this reason.

1. Inspect the bearings for smooth rotation after oiling.
2. Inspect the bearing rollers for wear.
3. Inspect the bearing cups for the following conditions:
 - Wear
 - Cracks
 - Brinelling
 - Scoring

DIFFERENTIAL CASE AND GEARS INSPECTION

1. Inspect the following components for excessive wear and/or fit:
 - The pinion gear shaft
 - The thrust washers
 - The differential case for wear, cracks and scoring
 - The fit of the pinion gear shaft in the differential case
 - The fit of the differential side gears in the differential case
 - The fit of the side gears on the axle shafts
2. Inspect the teeth of the pinion gears and the differential side gears for the following conditions:
 - Wear
 - Cracks
 - Scoring
 - Spalling
3. Replace any worn or poor fitting components as necessary.

PINION AND RING GEAR INSPECTION

1. The ring and pinion gears are matched sets and must be replaced any time a replacement of either is necessary.
2. Inspect the pinion and the ring gear teeth for the following conditions:
 - Cracking
 - Chipping
 - Scoring
 - Excessive wear

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3. Inspect the pinion gear splines for wear.
4. Inspect the pinion flange splines for wear.
5. Inspect the fit of the pinion flange on the pinion gear.
6. Inspect the sealing surface of the pinion flange for nicks, burrs, or rough tool marks which will damage the inside diameter of the pinion seal and result in an oil leak.
7. Inspect all of the parts for wear and replace as necessary.

THRUST WASHERS, SHIMS, AND ADJUSTER SLEEVES INSPECTION

1. Inspect the shims and the thrust washers for cracks and chips.

The damaged shims should be replaced with an equally sized service shim.

2. Inspect the adjuster sleeves for damaged threads. Replace if required.

DIFFERENTIAL CASE ASSEMBLY ASSEMBLE

Tools Required

- **J 33790** Differential Side Bearing Installer. See Special Tools and Equipment.
- **J 8092** Universal Driver Handle- 3/4 in - 10

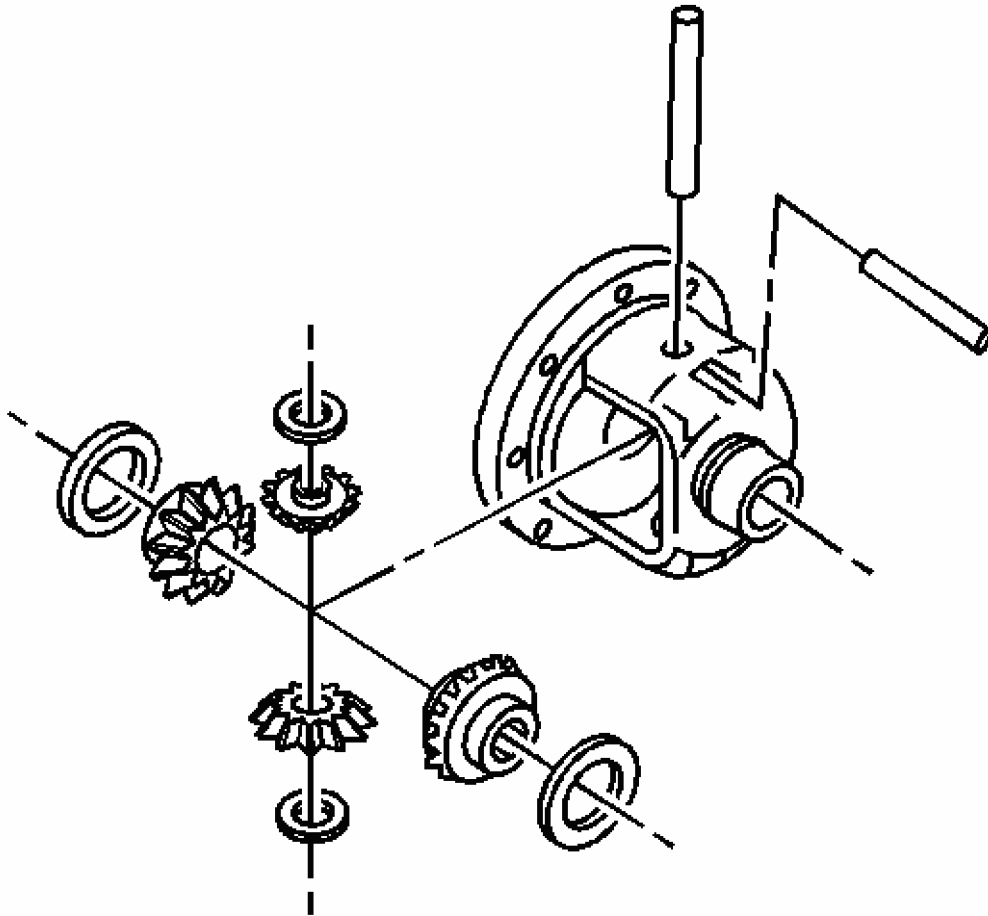


Fig. 118: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

1. Install the thrust washers and the differential side gears into the differential case.

If the same differential side gears and the thrust washers are being used, install the gears and the washers to the original locations.

2. Install the differential pinion gears.
 - A. Position 1 pinion gear between the differential side gears.
 - B. Rotate the differential side gears until the pinion gear is directly opposite the opening in the differential case.
 - C. Place the other pinion gear between the differential side gears.

Line up the hole in both pinion gears.

3. Install the thrust washers.

Rotate the pinion gears toward the opening in order to permit the sliding in of the thrust washers.

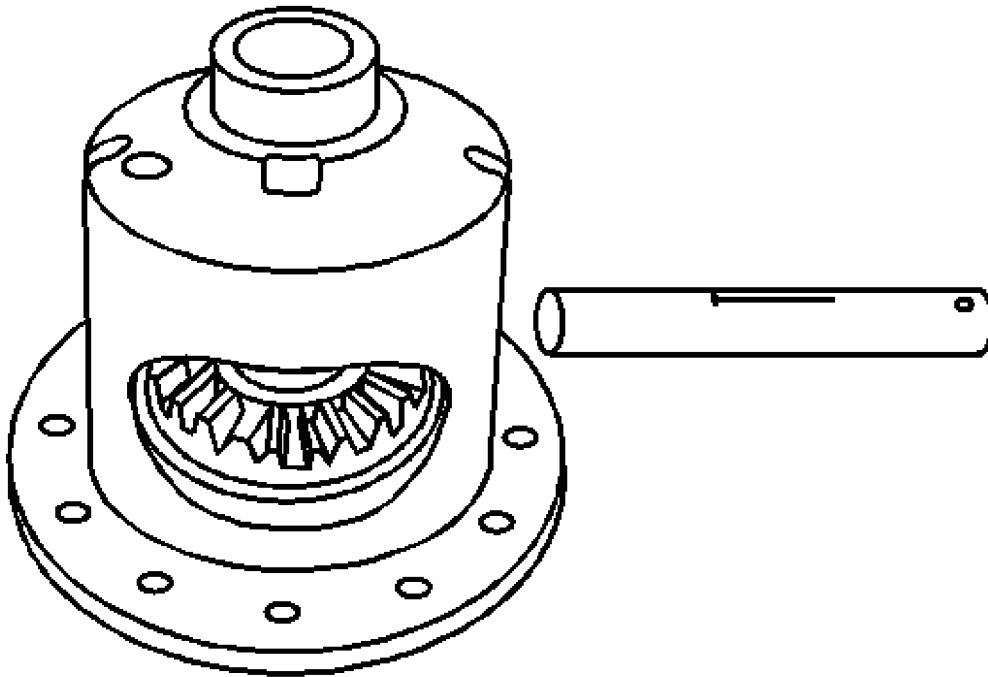


Fig. 119: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

4. Install the pinion gear shaft.

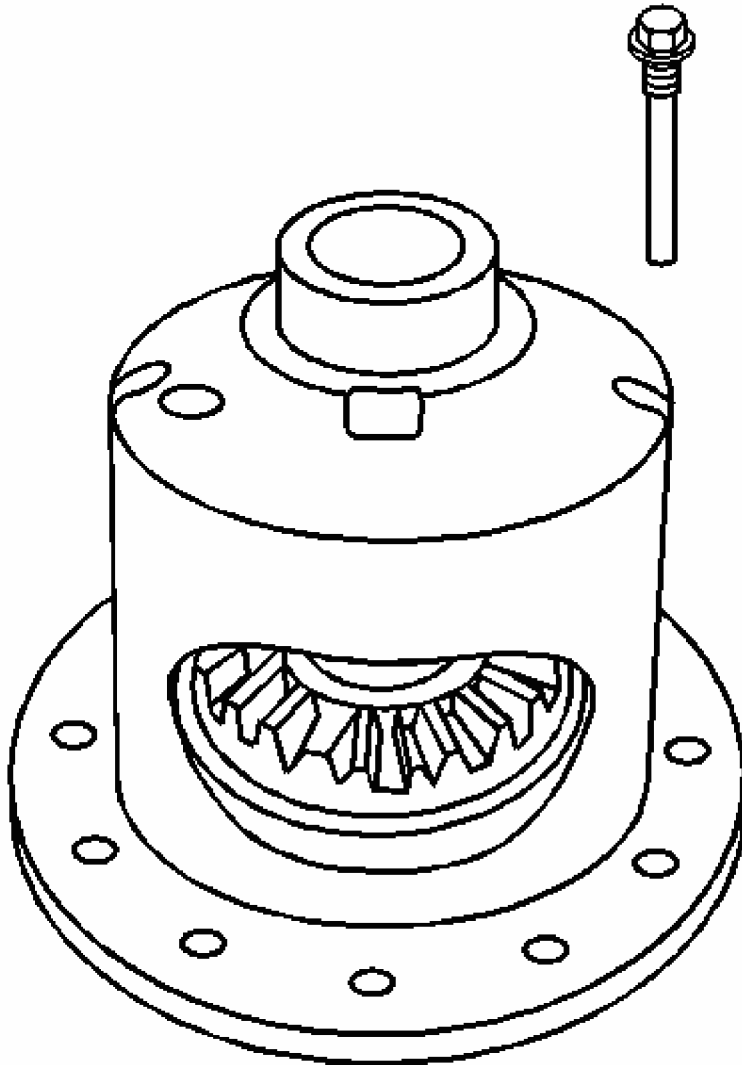


Fig. 120: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the pinion gear shaft lock bolt.

Tighten: Tighten the pinion shaft lock bolt to 33 N.m (24 lb ft).

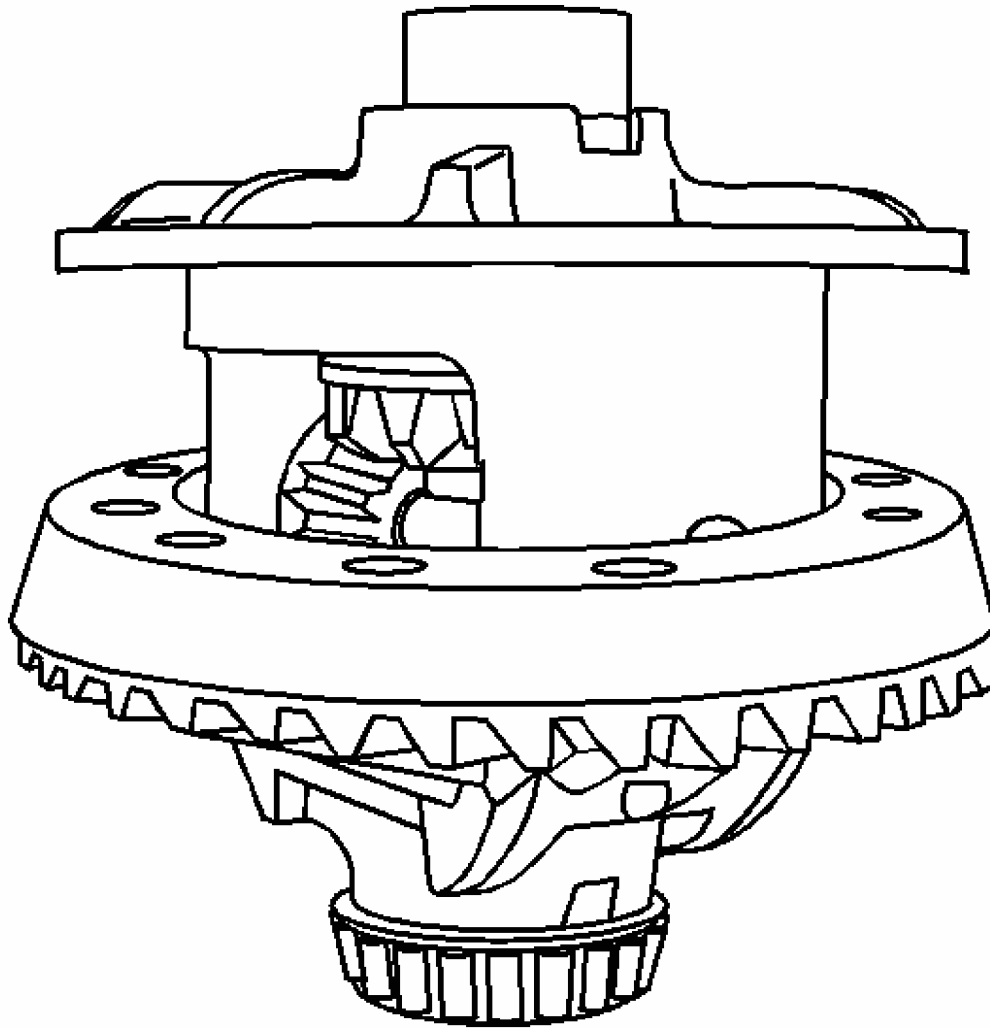


Fig. 121: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

6. Install the ring gear onto the differential case.

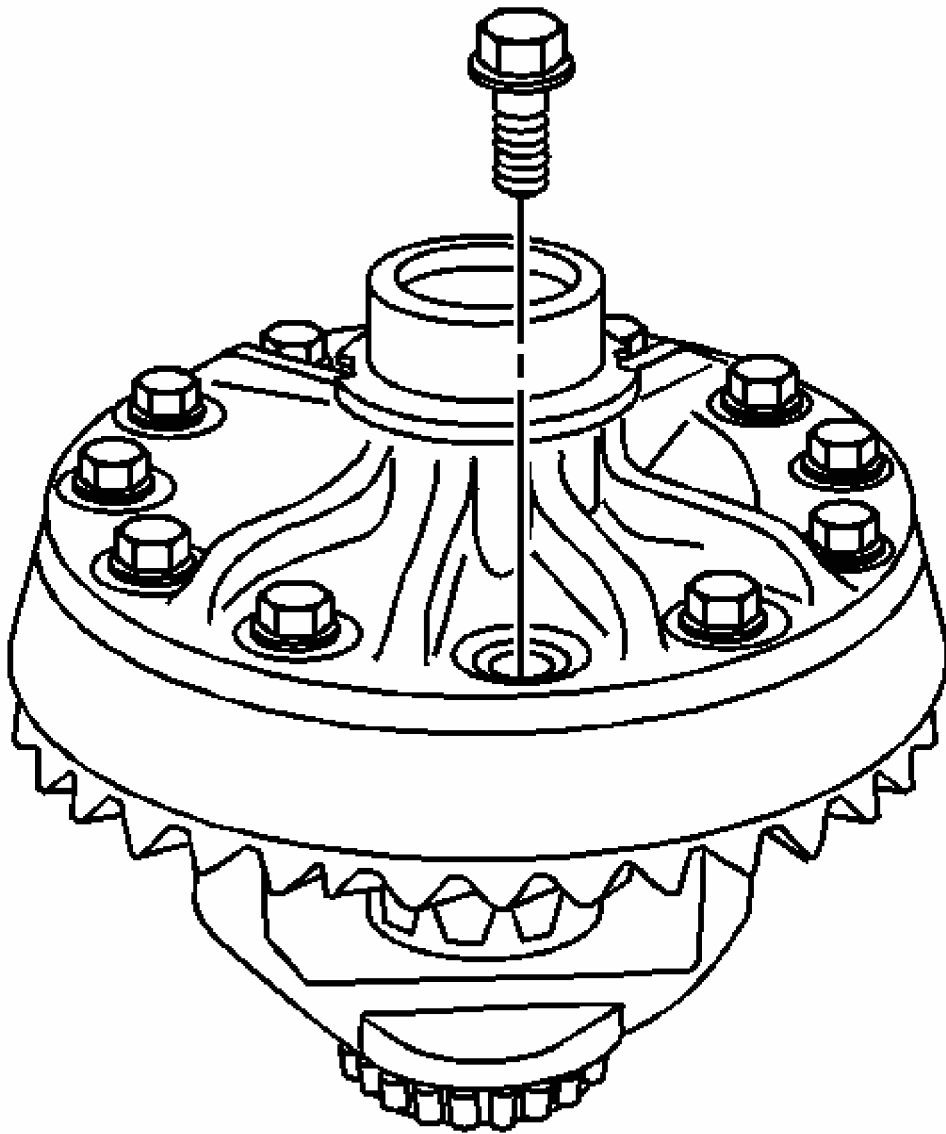


Fig. 122: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-hand threads

7. Install the new ring gear bolts.

Hand start each bolt to ensure that the ring gear is properly installed to the differential

case.

8. Tighten the new ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

Tighten: Tighten the ring gear bolts in sequence to 80 N.m (59 lb ft).

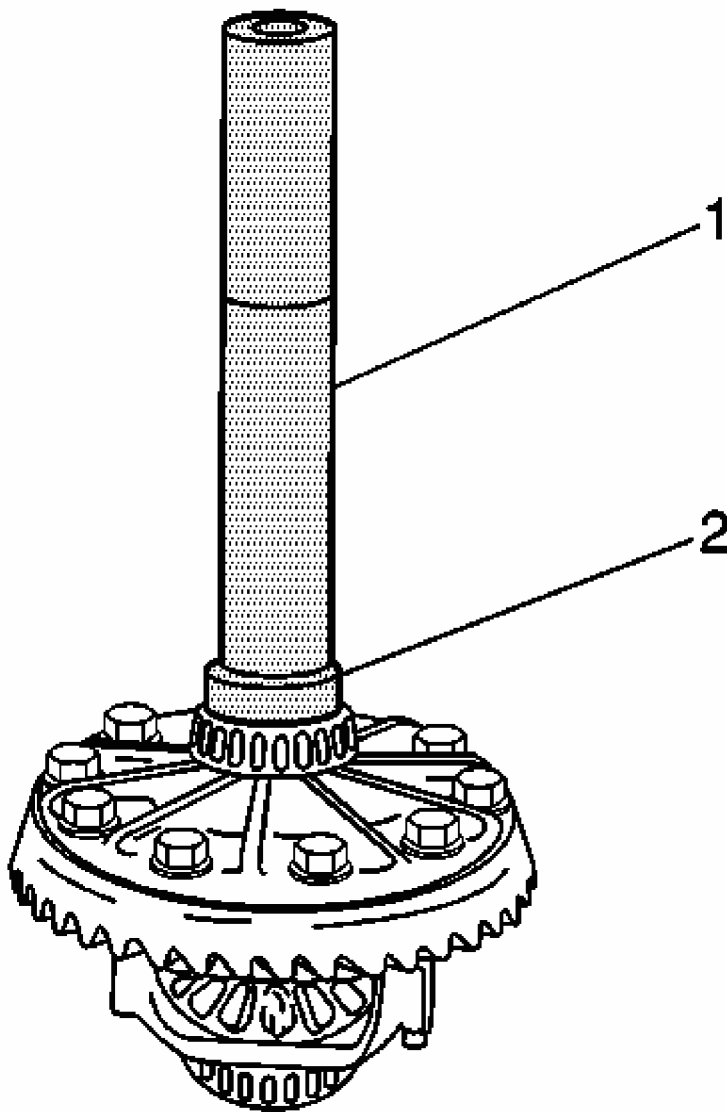


Fig. 123: Installing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

9. Install the differential case bearings using the **J 8092** (1) and the **J 33790** (2).

PINION BEARING CUP INSTALLATION

Tools Required

J 33837 Pinion Bearing Cup Remover and Installer. See Special Tools and Equipment.

1. Install the left differential carrier case into the **J 33837** . See Special Tools and Equipment.

Tighten the attaching bolts securely.

2. Install the **J 33837-3**.

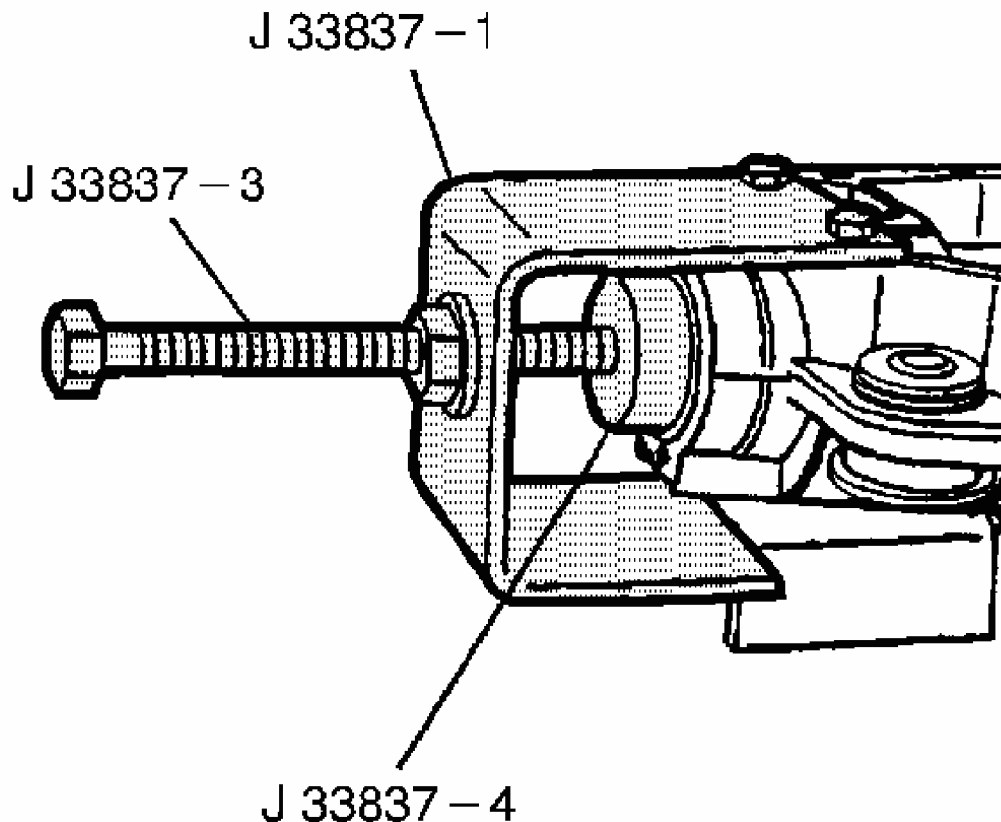


Fig. 124: Installing J 33837-4 Onto J 33837-3
Courtesy of GENERAL MOTORS CORP.

3. Install the **J 33837-4** onto the **J 33837-3**.

4. Install the outer pinion bearing cup onto the differential carrier case.
5. Install the outer pinion bearing cup by holding the **J 33837-3** and turning the nut sleeve of the **J 33837-1** counterclockwise in order to push the outer pinion bearing cup into place.

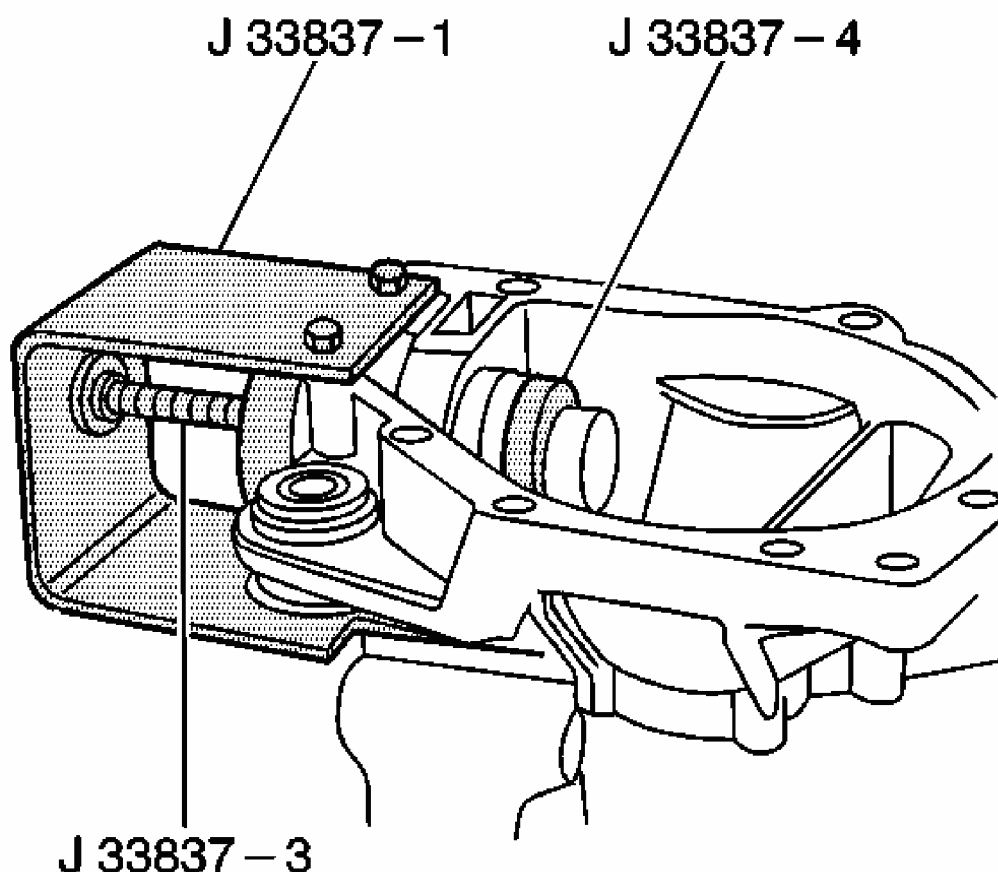


Fig. 125: Installing Inner Pinion Bearing Cup Into Differential Carrier Case Opening
Courtesy of GENERAL MOTORS CORP.

6. Install the inner pinion bearing cup into the differential carrier case opening.
7. Place the **J 33837-4** in the inner pinion bearing cup.
8. Extend the **J 33837-3** through the pinion bearing cup bore.
9. Install the **J 33837-4** onto the **J 33837-3**.
10. Seat the inner bearing cup by holding the **J 33837-3** and turning the nut sleeve of the **J 33837-1** clockwise until the **J 33837-4** is snug against the inner pinion bearing cup.

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Rotate the **J 33837-4** several times in order to ensure the inner pinion bearing cup is not cocked in the bore.

11. Install the inner bearing cup by holding the **J 33837-3** and turning the nut sleeve of the **J 33837-1** clockwise in order to pull the inner pinion bearing cup into place.

PINION DEPTH ADJUSTMENT

Tools Required

- **J 33838** Pinion Setting Gage. See Special Tools and Equipment.
- **J 29763** Static Time Gage. See Special Tools and Equipment.

IMPORTANT: Make sure all of the tools, the pinion bearings, and the pinion bearing cups are clean before proceeding.

1. Lubricate the pinion bearings with axle lubricant. Refer to Fluid and Lubricant Recommendations in Maintenance and Lubrication.
2. Install the pinion bearings and hold them in place.

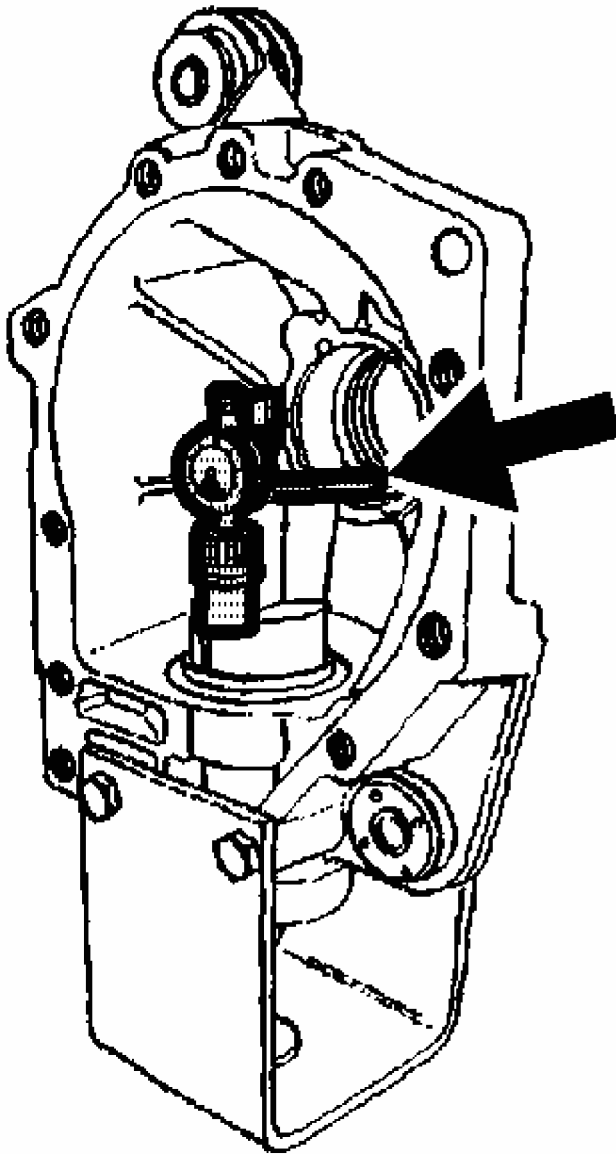


Fig. 126: Adjusting Pinion Depth
Courtesy of GENERAL MOTORS CORP.

3. Install the J 33838 and J 29763 as shown.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. While holding the J 33838 stationary, install an inch-pound torque wrench on the nut of

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the **J 33838** .

Tighten: Tighten the nut until a rotating torque of 1.0-1.7 N.m (10-15 lb in) is obtained.

5. Rotate the assembly several times in both directions in order to seat the pinion bearings.
6. Check the rotating torque of the assembly. If the torque is less than 1.0 N.m (10 lb in), tighten the nut.

Tighten: Tighten the nut until a rotating torque of 1.0-1.7 N.m (10-15 lb in) is obtained.

7. Adjust the **J 29763** to the differential bearing bore by doing the following:
 - A. Loosen the lock nut on the **J 29763** .
 - B. Place the contact pad of the **J 29763** on the differential side bearing bore.
 - C. With the contact pad of the **J 29763** touching the differential side bearing bore, push down on the **J 29763** until the needle of the **J 29763** has turned 3/4 of a turn clockwise.
 - D. Tighten the lock nut of the **J 29763** .
8. Rotate the **J 33838** back and forth until the needle of the **J 29763** indicates the lowest point in the differential side bearing bore.
9. At the lowest point of deflection, move the housing of the **J 29763** until the needle indicates zero.
10. Move the **J 33838** back and forth again to verify the zero setting. Adjust the housing of the **J 29763** as necessary to set the needle to zero.

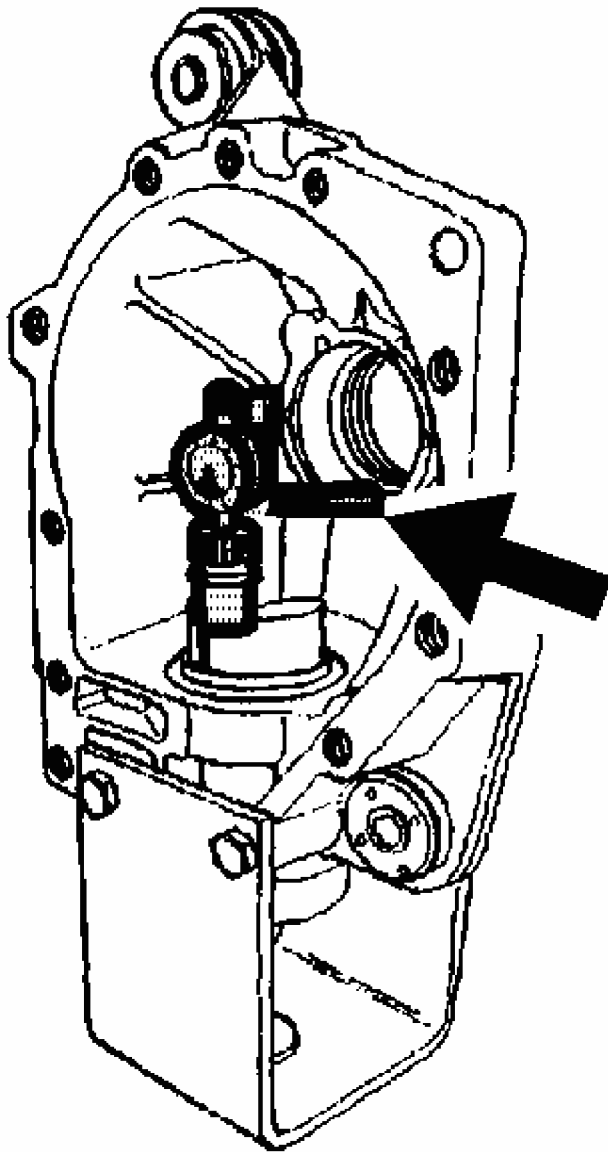


Fig. 127: View Of J 33838 installed In Differential Side Bearing Bore
Courtesy of GENERAL MOTORS CORP.

11. After the zero setting is obtained and verified, grasp the **J 33838** by the flats and move the **J 33838** out of the differential side bearing bore.
12. The value indicated on the **J 29763** is the thickness of the shim needed in order to set the depth of the pinion.
13. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.

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14. Remove the pinion depth setting tools.
15. Remove the pinion bearings.
16. Install the pinion shim between the pinion and the inner pinion bearing. Refer to **Differential Carrier Assembly - Assemble**.

DIFFERENTIAL CARRIER ASSEMBLY - ASSEMBLE

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in-10
 - **J 33785** Pinion Bearing Installer. See **Special Tools and Equipment**.
 - **J 42211** Axle Bearing Installer. See **Special Tools and Equipment**.
 - **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools and Equipment**.
 - **J 33782** Pinion Oil Seal Installer. See **Special Tools and Equipment**.
 - **J 33788** Output Shaft Bearing Installer. See **Special Tools and Equipment**.
 - **J 33792** Side Bearing Adjuster Wrench. See **Special Tools and Equipment**.
 - **J 33837** Pinion Bearing Cup Remover and Installer. See **Special Tools and Equipment**.
 - **J 23423-A** Case Bearing Race Installer. See **Special Tools and Equipment**.
 - **J 42213** Adjuster Sleeve Socket. See **Special Tools and Equipment**.
1. Install the selective shim between the inner pinion bearing and the shoulder of the pinion gear.

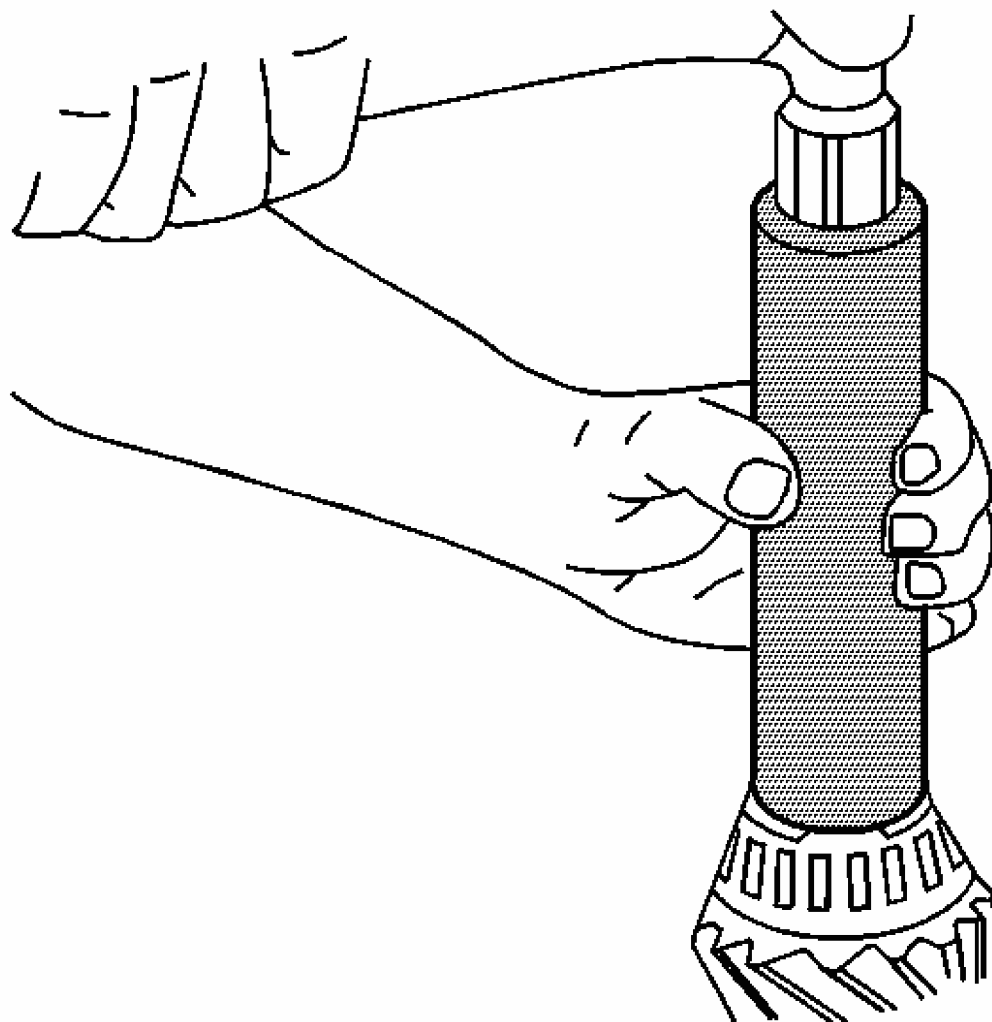


Fig. 128: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing onto the pinion gear using the J 33785 .
3. Install the new collapsible spacer onto the pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

IMPORTANT: Stake the new deflector at 3 new equally spaced positions. You must stake the new deflector in such a way that you do not damage the pinion sealing surface.

5. Install the new deflector by doing the following:
 - A. Make sure the sealing surface of the pinion yoke is clean of burrs, if applicable.
 - B. Install the new deflector onto the pinion yoke by tapping the deflector evenly using a hammer and a brass drift in small increments.
 - C. Stake the new deflector to the pinion yoke in 3 positions.
6. Install the left differential carrier case into the **J 33837**.

Tighten the attaching bolts securely.

7. Install the outer pinion bearing.

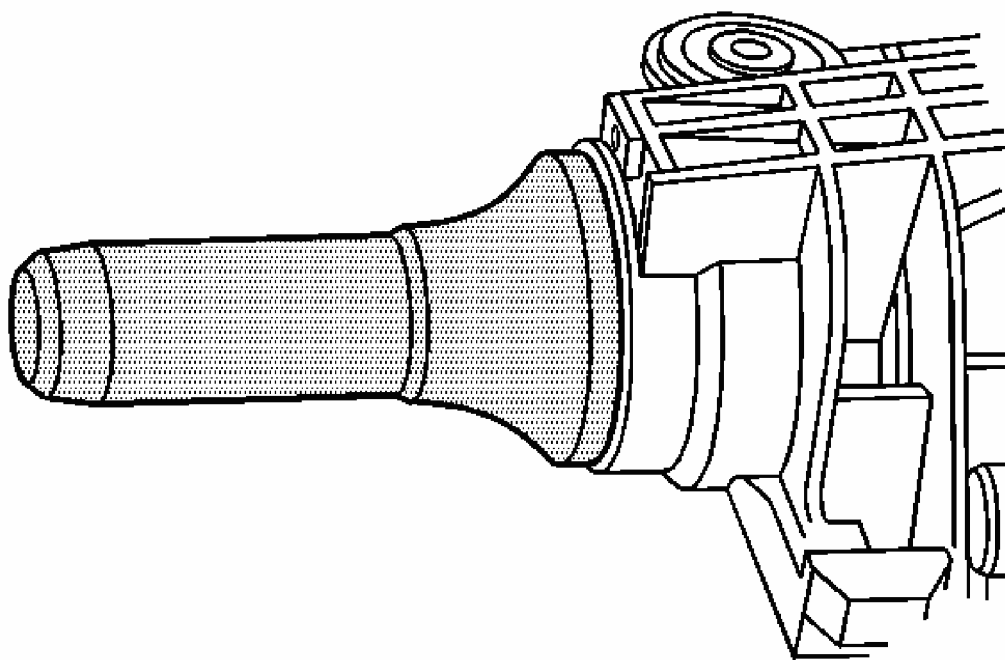


Fig. 129: Installing Oil Seal Using J 36366
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Drive the seal in straight, not at an angle, as this will damage the aluminum housing.

8. Install the oil seal by doing the following:
 - A. Position the oil seal in the bore.
 - B. Install the **J 33782** over the oil seal.

- C. Strike the **J 33782** with a hammer until the seal flange seats on the axle housing surface.
9. Install the pinion gear, the selectable shim with inner pinion bearing and the new collapsible spacer, into the left differential carrier case.
 10. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the pinion yoke.
 11. Install the pinion yoke.

NOTE: Do not hammer the pinion flange/yoke onto the pinion shaft. Pinion components may be damaged if the pinion flange/yoke is hammered onto the pinion shaft.

12. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
13. Install the washer and a new pinion nut.

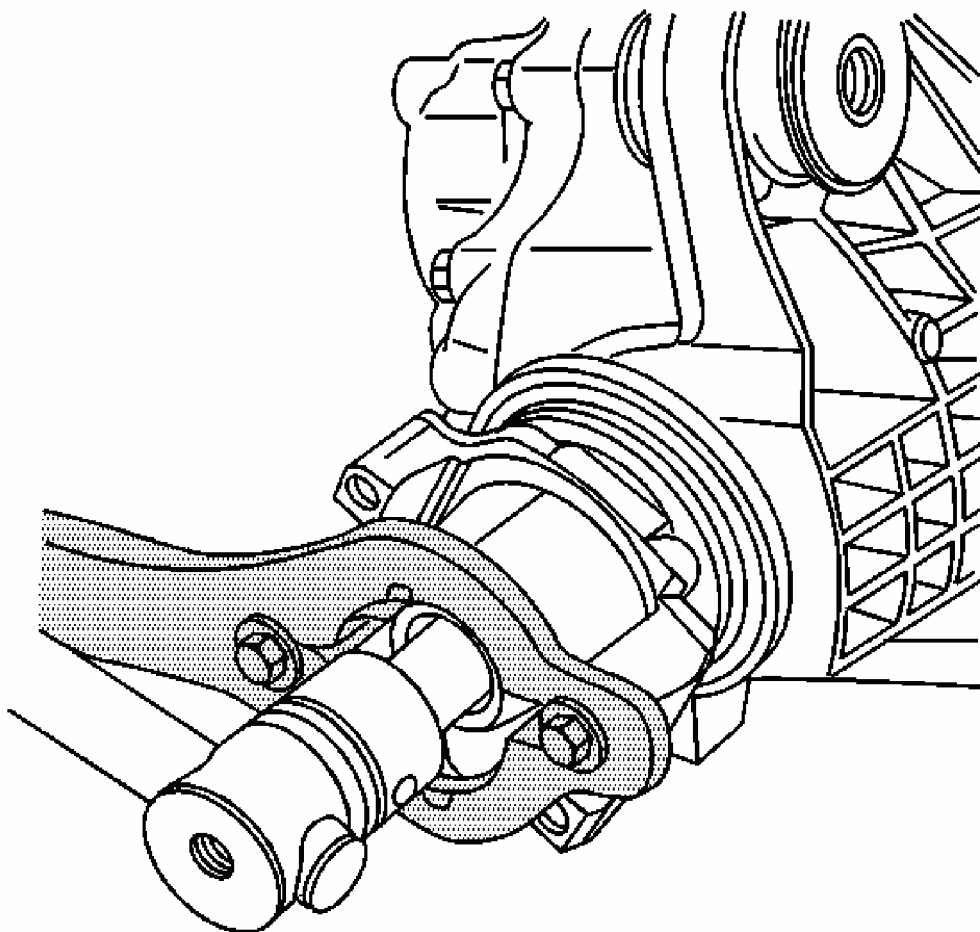


Fig. 130: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

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14. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

15. Tighten the pinion nut while holding the **J 8614-01**.

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

16. Measure the rotating torque of the pinion using an inch-pound torque wrench.

Specification: The rotating torque of the pinion should be 1.0-2.8 N.m (10-25 lb in) for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

17. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, continue to tighten the pinion nut.

Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is 0.40-0.57 N.m (3-5 lb in) greater than the torque recorded during removal for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

18. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.

Recheck the rotating torque and adjust if necessary.

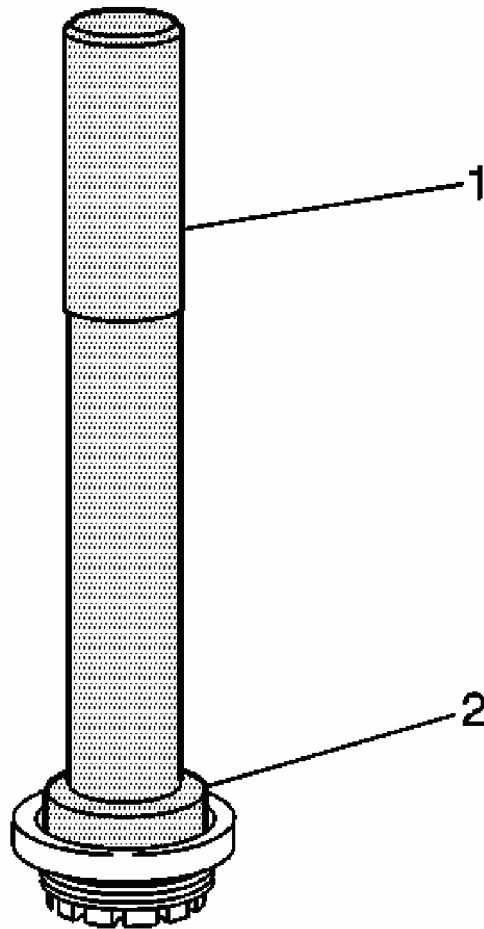


Fig. 131: Installing Left Inner Axle Shaft Bearing Into Differential Adjuster Nut Sleeve

Courtesy of GENERAL MOTORS CORP.

19. Install the left inner axle shaft bearing into the differential adjuster nut sleeve using the **J 8092** (1) and the **J 42211** (2).
20. Install the left inner axle shaft bearing and the differential bearing adjuster nut into the left differential carrier case.
21. Install the left differential case bearing cup into the left differential carrier assembly case half using the **J 23423-A** and the **J 8092**.
22. Install the right inner axle shaft bearing into the right differential adjuster nut sleeve using the **J 8092** (1) and the **J 33788** (2).

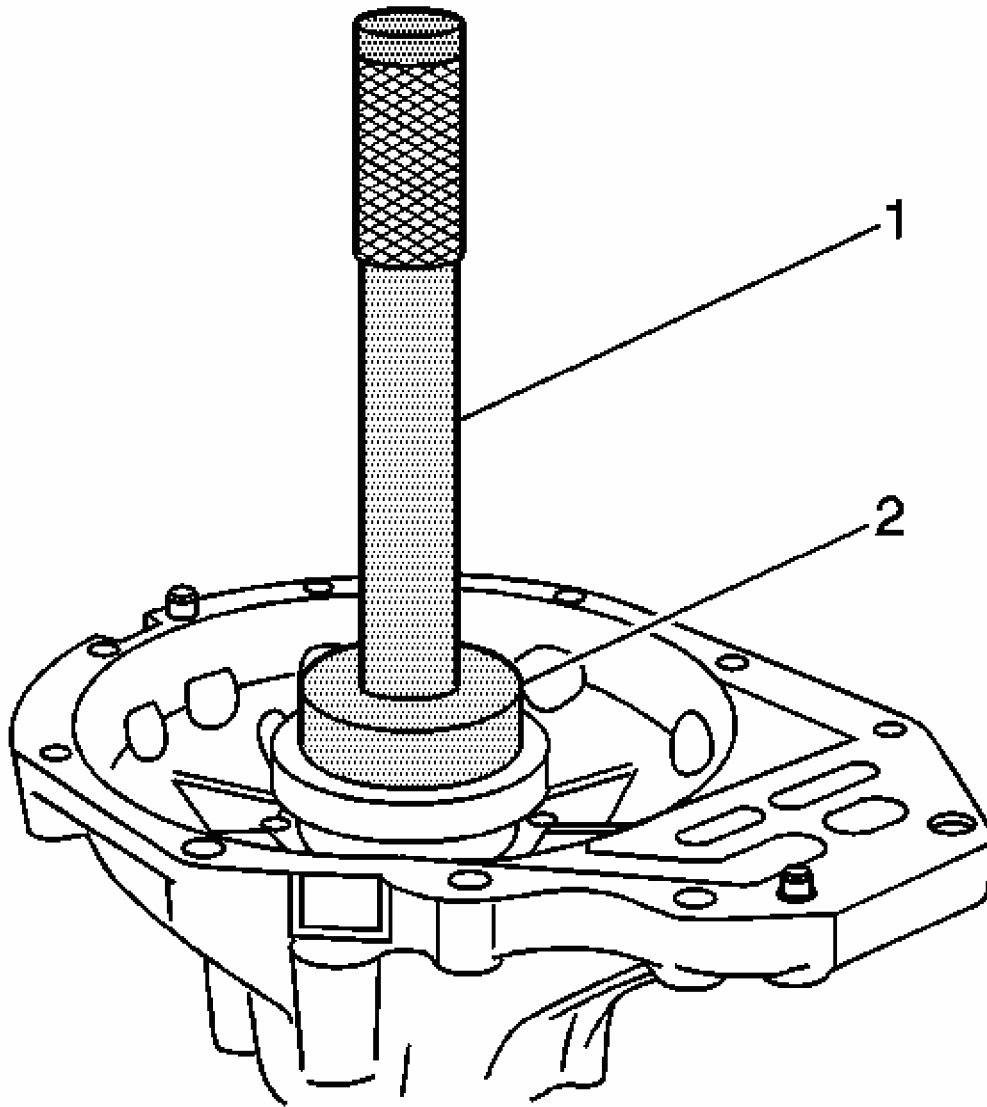


Fig. 132: Installing Right Differential Bearing Adjuster Assembly & Right Differential Case Side Bearing Cup
Courtesy of GENERAL MOTORS CORP.

23. Install the right differential bearing adjuster assembly and the right differential case side bearing cup into the right differential carrier case half using the **J 23423-A** (2) and the **J 8092** (1).
24. Install the differential case assembly into the left differential carrier case half.
25. Using the **J 42213** , turn the left differential adjuster nut sleeve in until there is a slight amount of backlash felt between the ring gear and the pinion.

26. Install the right differential carrier case half to the left differential carrier case half.

Do not use sealer at this time.

If the carrier case halves do not make complete contact, use the **J 33792** in order to back out the right differential adjuster nut sleeve.

27. Install the differential carrier case bolts.

Tighten: Tighten the differential carrier case bolts to 50 N.m (37 lb ft).

28. Adjust the backlash. Refer to **Backlash Inspection and Adjustment**.

BACKLASH INSPECTION AND ADJUSTMENT

Tools Required

- **J 33792** Side Bearing Adjustment Wrench. See **Special Tools and Equipment**.
- **J 42213** Adjuster Sleeve Socket. See **Special Tools and Equipment**.

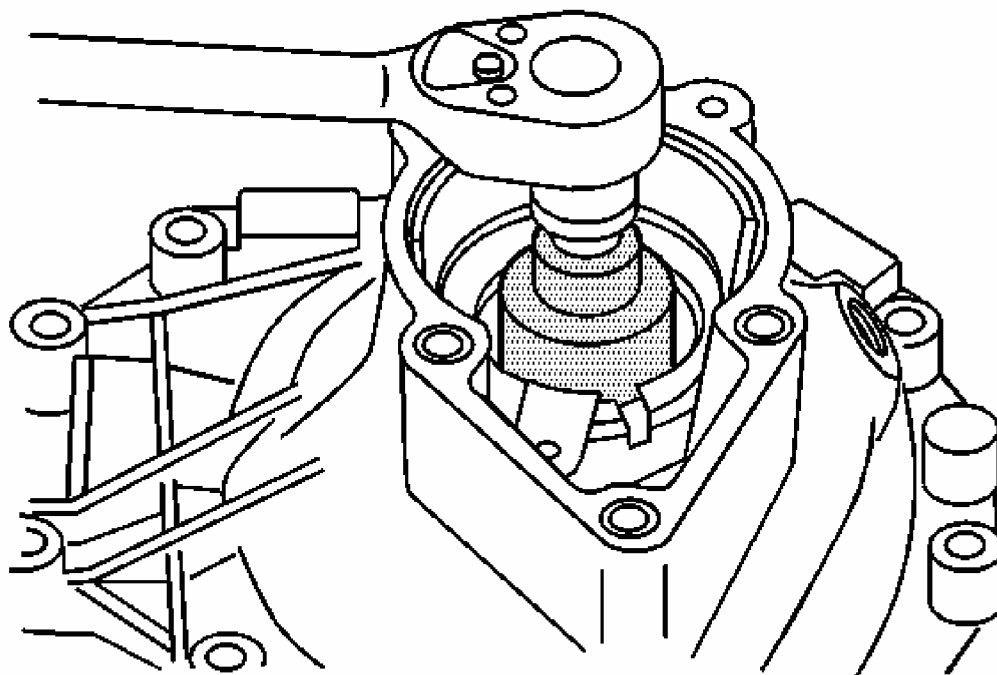


Fig. 133: Removing & Installing Right Differential Bearing Adjuster & Differential Case Bearing Cup

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Courtesy of GENERAL MOTORS CORP.

1. Slowly turn the **J 33792** clockwise until the right differential adjuster nut sleeve contacts the differential case bearing.
2. Install the **J 42213** to the left differential adjuster nut sleeve.
3. Slowly turn the **J 42213** clockwise until the left differential adjuster nut sleeve contacts the differential case bearing.
4. Mark the location of the adjuster nut sleeves in relation to the carrier halves.

Ensure that the notches in the adjusting sleeves can be counted when turned.

5. Using the **J 33792** , turn the right differential adjuster nut sleeve out two notches.
6. Using the **J 42213** , turn the left differential adjuster nut sleeve in one notch.
7. Rotate the pinion several times in order to seat the bearings.

Measuring Backlash

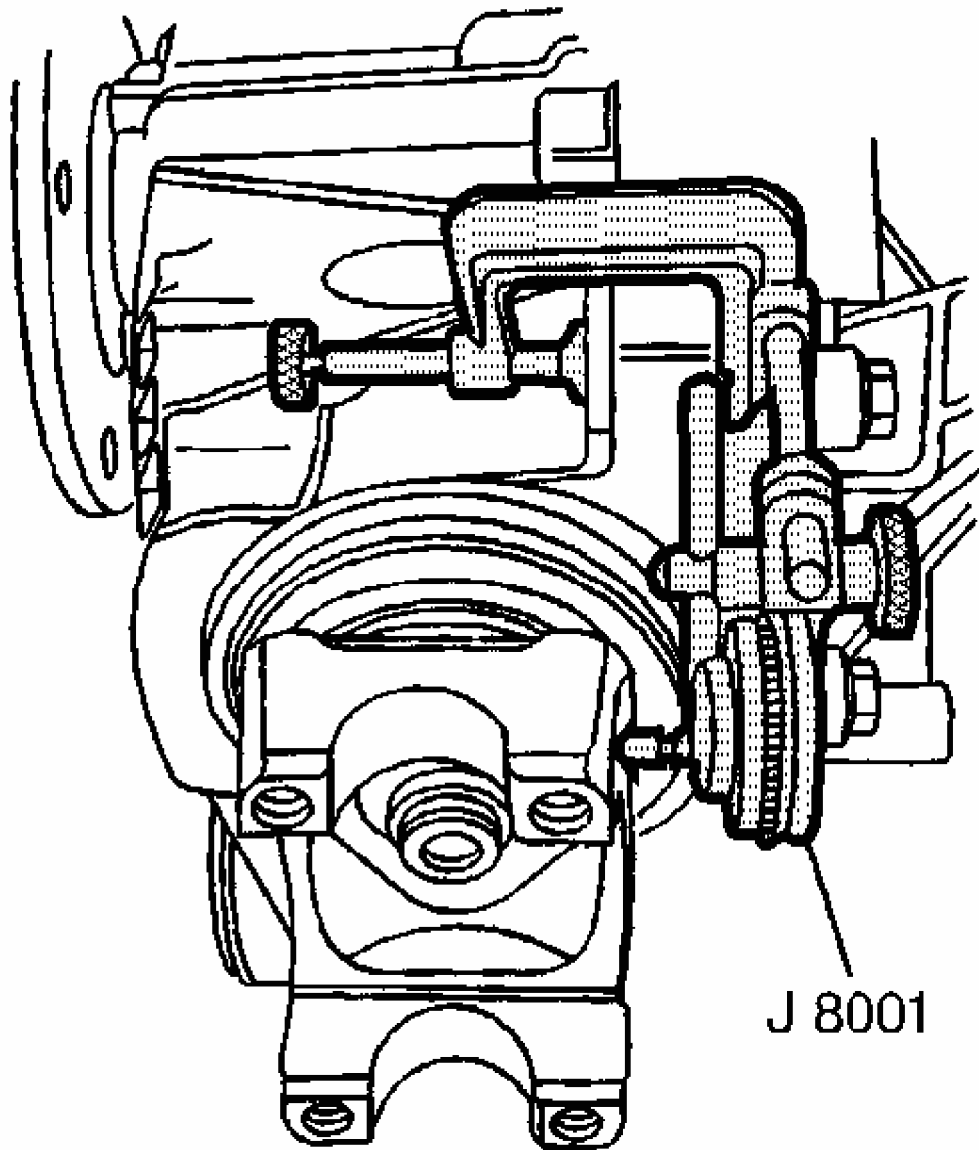


Fig. 134: Measuring Backlash
Courtesy of GENERAL MOTORS CORP.

1. Install a dial indicator so the button contacts the outer edge of the pinion yoke.

Ensure that the plunger is at a right angle to the pinion yoke.

2. Move the pinion yoke back and forth through the pinion flange's free play while not allowing the ring gear to move.

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3. Record the dial indicator reading.
4. To determine the actual backlash, divide the dial indicator reading by 2.

An actual dial indicator reading of 0.16 mm (0.006 in) means that there is actually 0.08 mm (0.003 in) backlash.

Specification: The backlash between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred specification of 0.13-0.18 mm (0.005-0.007 in).

IMPORTANT: When adjusting the backlash, observe the following:

- Always turn the left and the right differential adjuster nut sleeves in equal amounts.
 - Turning the differential adjuster nut sleeves one notch will change the backlash about 0.08 mm (0.003 in).
 - Once the proper backlash is obtained, turn the left differential adjuster nut sleeve in one additional notch in order to preload the differential case side bearings.
5. If the backlash is too small, use the following procedure to adjust:
 - A. Increase the backlash by turning the left differential adjuster nut sleeve in one notch and the right differential adjuster nut sleeve out one notch.
 - B. Recheck the backlash and adjust as necessary.
 6. If the backlash is too large, use the following procedure to adjust:
 - A. Decrease the backlash by turning the right differential adjuster nut sleeve in one notch and the left differential adjuster nut sleeve out one notch.
 - B. Recheck the backlash and adjust as necessary.
 7. Once the proper backlash is obtained, turn the left differential adjuster nut sleeve in one additional notch using the **J 42213** in order to preload the differential case side bearings.
 8. Recheck the backlash and adjust as necessary.

DIFFERENTIAL CARRIER ASSEMBLY - FINAL ASSEMBLY

Tools Required

- **J 42738** Front Output Shaft Seal Installer. See Special Tools and Equipment.
- **J 33842** Pilot Bearing Installer. See Special Tools and Equipment.
- **J 33791** Carrier Case Bushing Installer. See Special Tools and Equipment.
- **J 42211** Inner Axle Shaft Housing Bearing Installer. See Special Tools and

Equipment.

- **J 33799** Shaft Cable Housing Seal Installer. See **Special Tools and Equipment.**

1. Install the differential adjuster nut lock tabs over the differential adjuster nut sleeves.

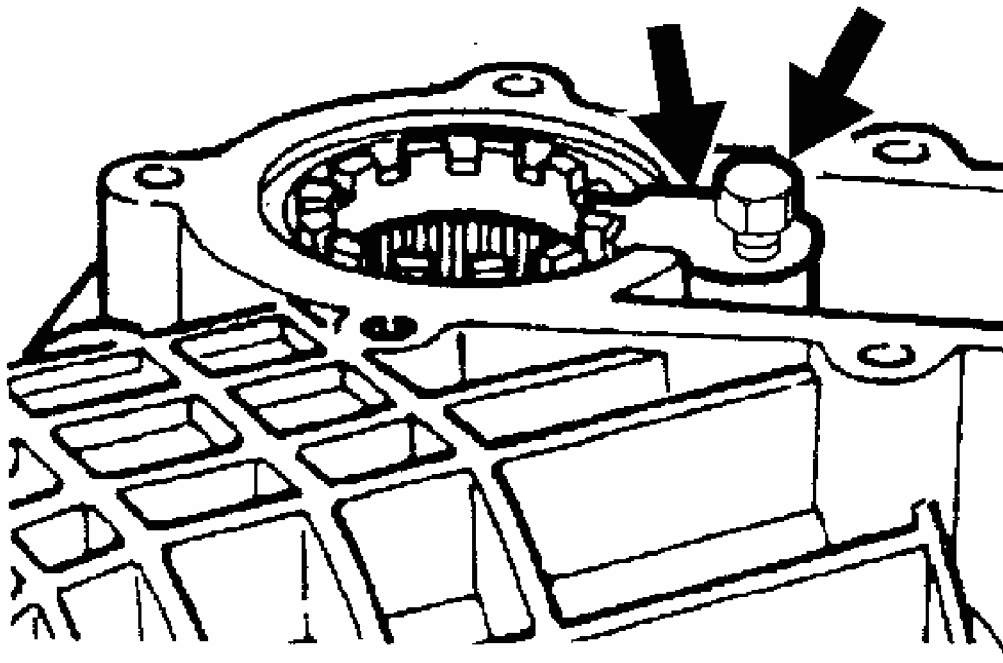


Fig. 135: View Of Differential Adjuster Nut Lock Tab Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the differential adjuster nut lock tab bolts.

Tighten: Tighten the differential adjuster nut lock tab bolt to 8 N.m (71 lb in).

3. Remove the differential carrier assembly bolts.
4. Remove the right differential carrier case half.
5. Clean the sealing surface of each half of the differential carrier case and the inner axle housing to differential carrier assembly.

The surfaces must be clean of all the grease and the oil.

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6. Apply a bead of sealer, GM P/N 1052942 (Canadian P/N 10953466) or the equivalent, to one differential carrier case half sealing surface.
7. Install the right differential carrier case half.
8. Install the differential carrier case bolts.

Tighten: Tighten the differential carrier case bolts to 50 N.m (37 lb ft).

9. Lubricate the clutch shaft pilot bearing with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

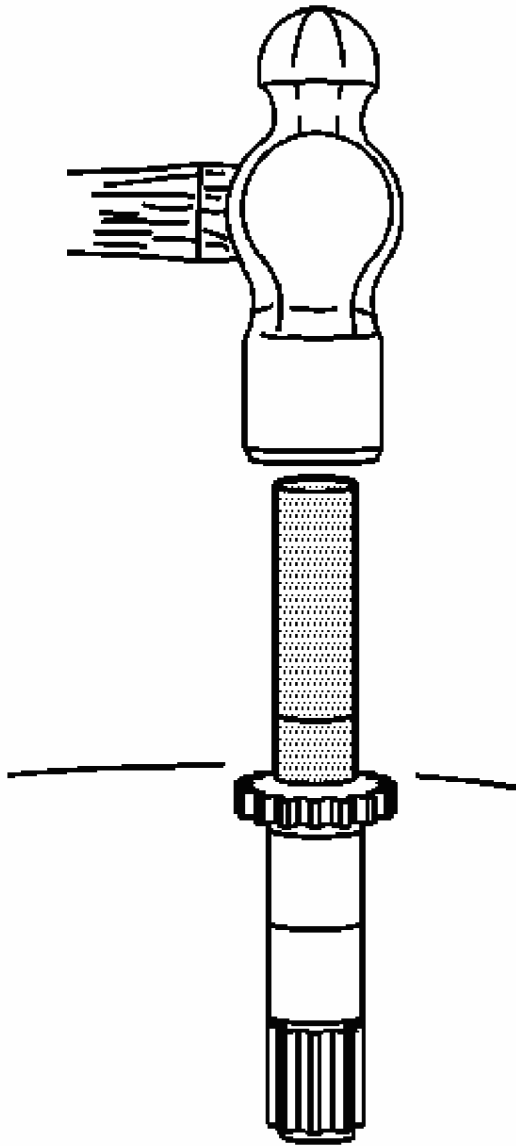


Fig. 136: Installing Clutch Shaft Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

10. Install the clutch shaft pilot bearing using the **J 33842**.
11. Install the clutch shaft thrust washer into the differential carrier assembly.
12. Install the clutch shaft to the differential carrier assembly.
13. Install the inner shaft seal cover.
14. Install the inner shaft seal cover bolts.

Tighten: Tighten the inner axle shaft seal cover bolts to 25 N.m (18 lb ft).

15. Install the new left side axle shaft seal using the **J 42738** .

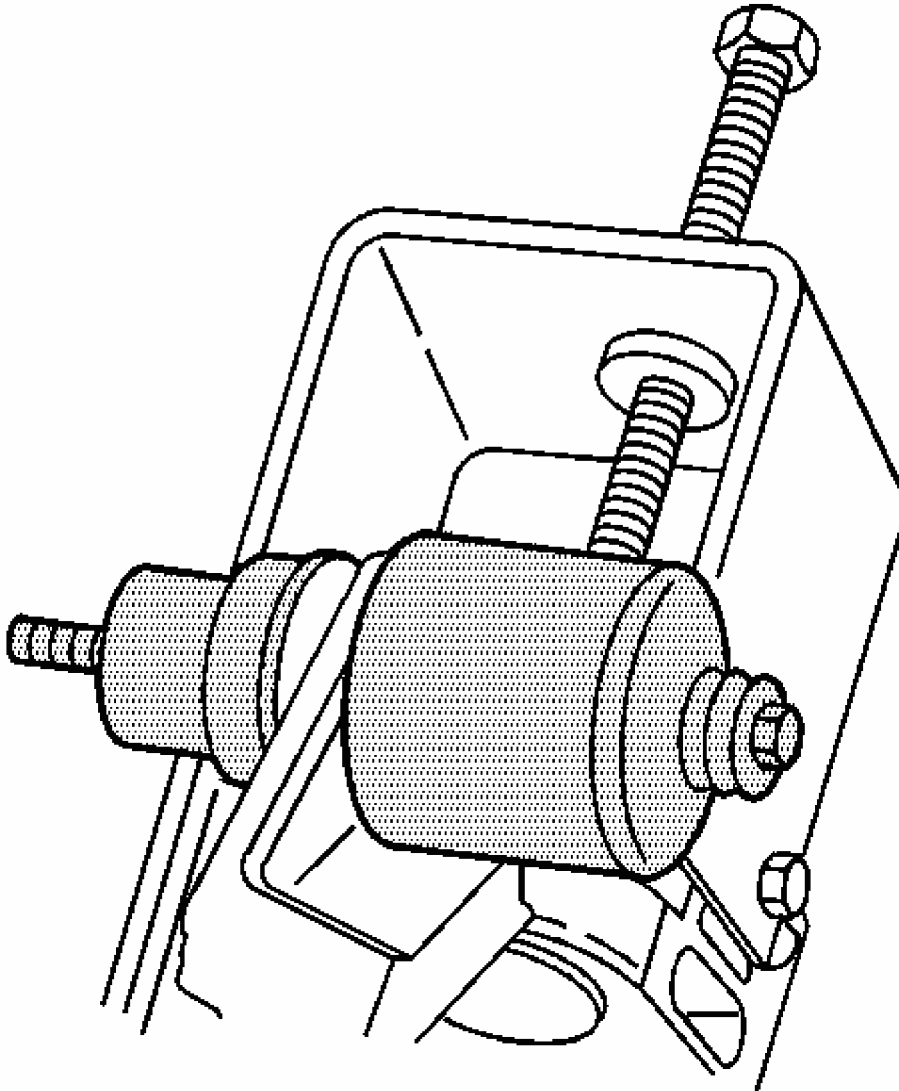


Fig. 137: Installing Carrier Bushing
Courtesy of GENERAL MOTORS CORP.

16. Install the differential carrier bushings using the **J 33791** .
17. Install the right side inner axle shaft housing bearing and the seal using the following procedure:

- A. Install the bearing with the square shoulder in using the **J 42211** . See **Special Tools and Equipment**.

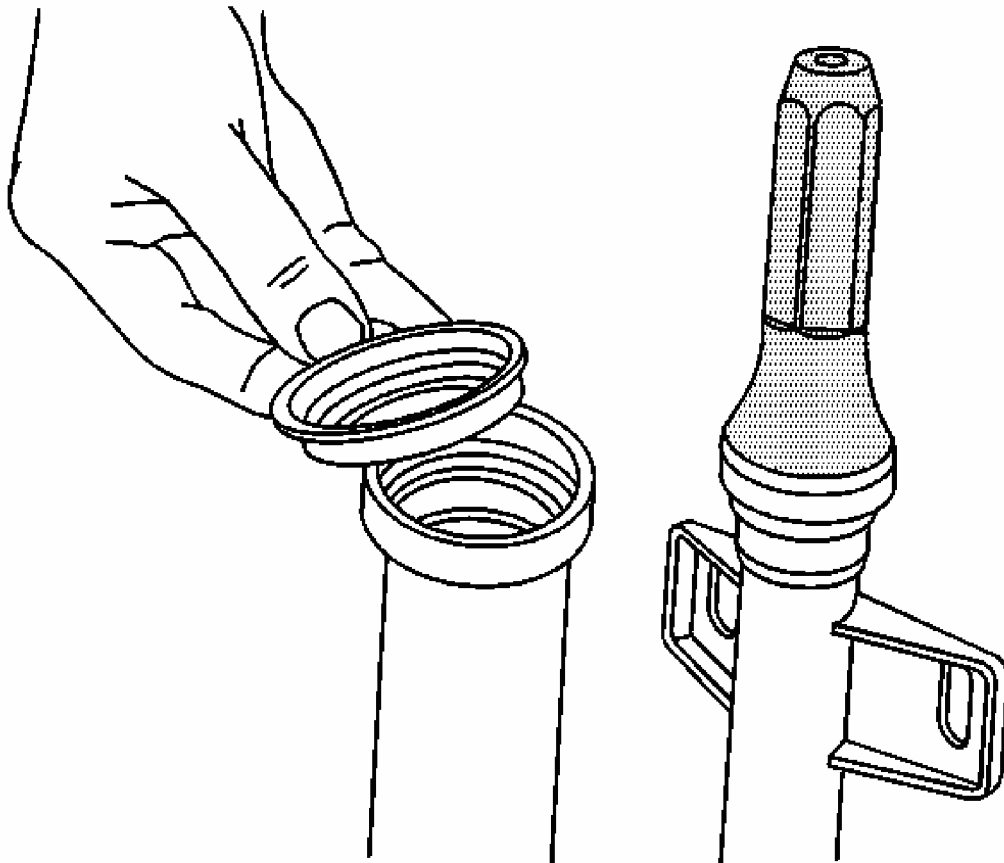


Fig. 138: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS CORP.

- B. Install the new axle shaft seal using the **J 42738** .

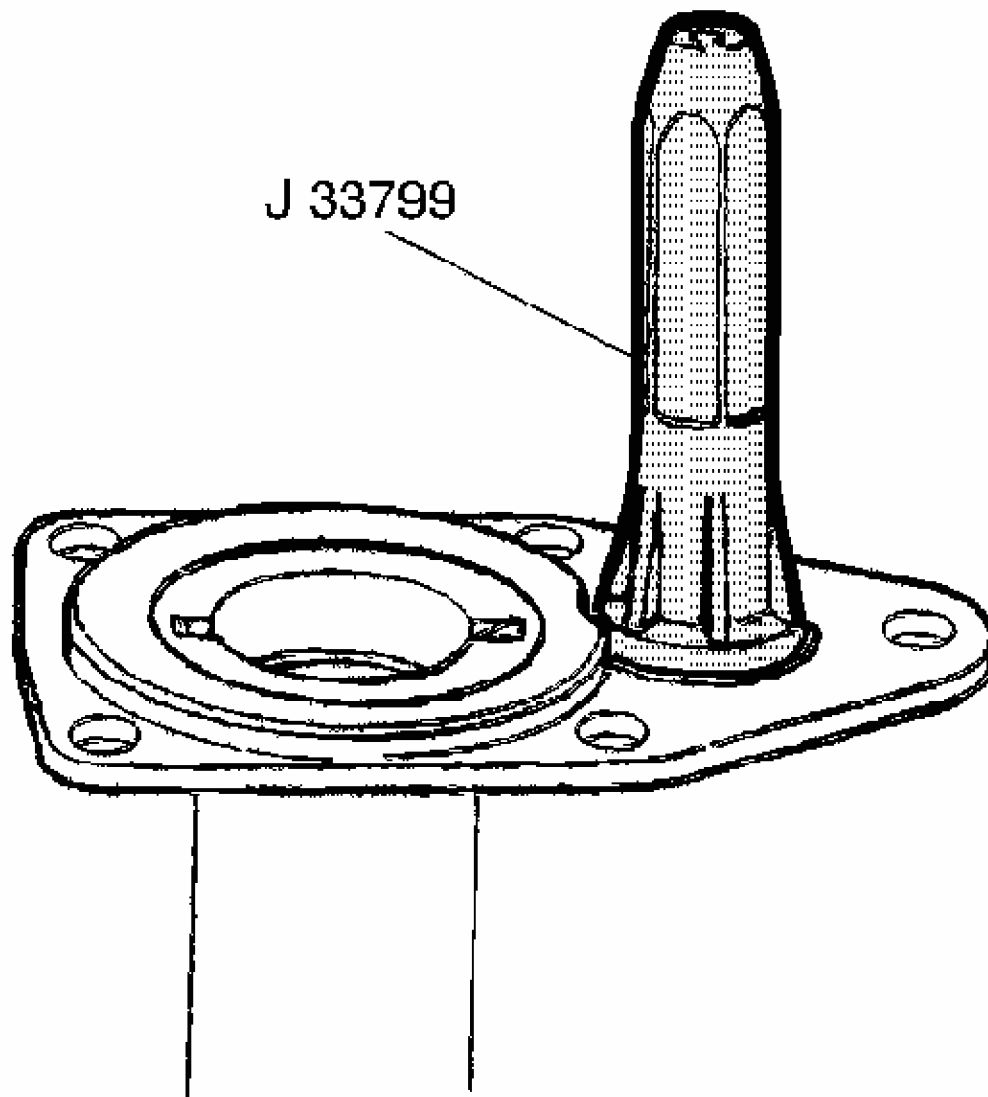


Fig. 139: Installing Clutch Fork Seal
Courtesy of GENERAL MOTORS CORP.

18. Install the clutch cable housing seal using the **J 33799** .
19. Install the inner axle shaft into the inner axle shaft housing.

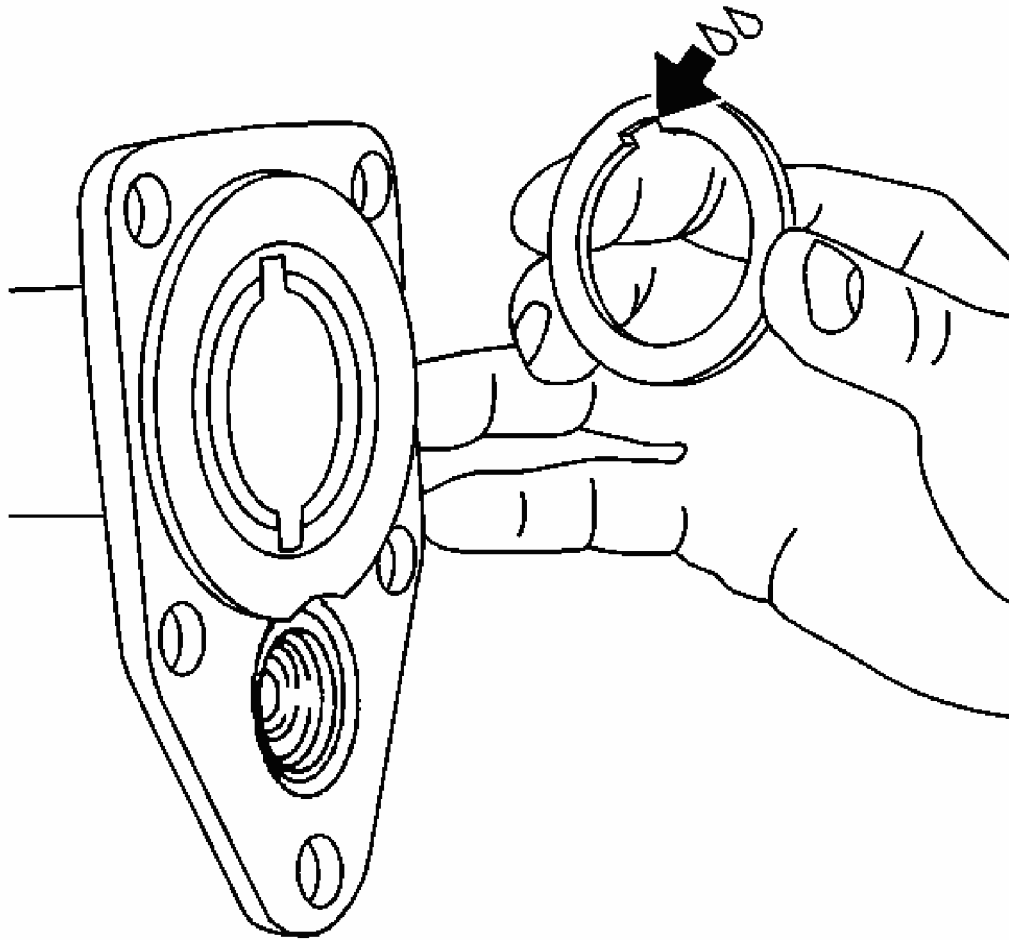


Fig. 140: Installing Thrust Washer Into Inner Axle Shaft Housing
Courtesy of GENERAL MOTORS CORP.

20. Install the thrust washer into the inner axle shaft housing. Use chassis grease in order to hold the thrust washer in place.

Ensure the tabs on the thrust washer align with the slot in the inner axle shaft housing.

21. Install the new retaining ring into the clutch gear.
22. Install the clutch gear onto the inner axle shaft.

Drive the clutch gear into place with a plastic hammer.

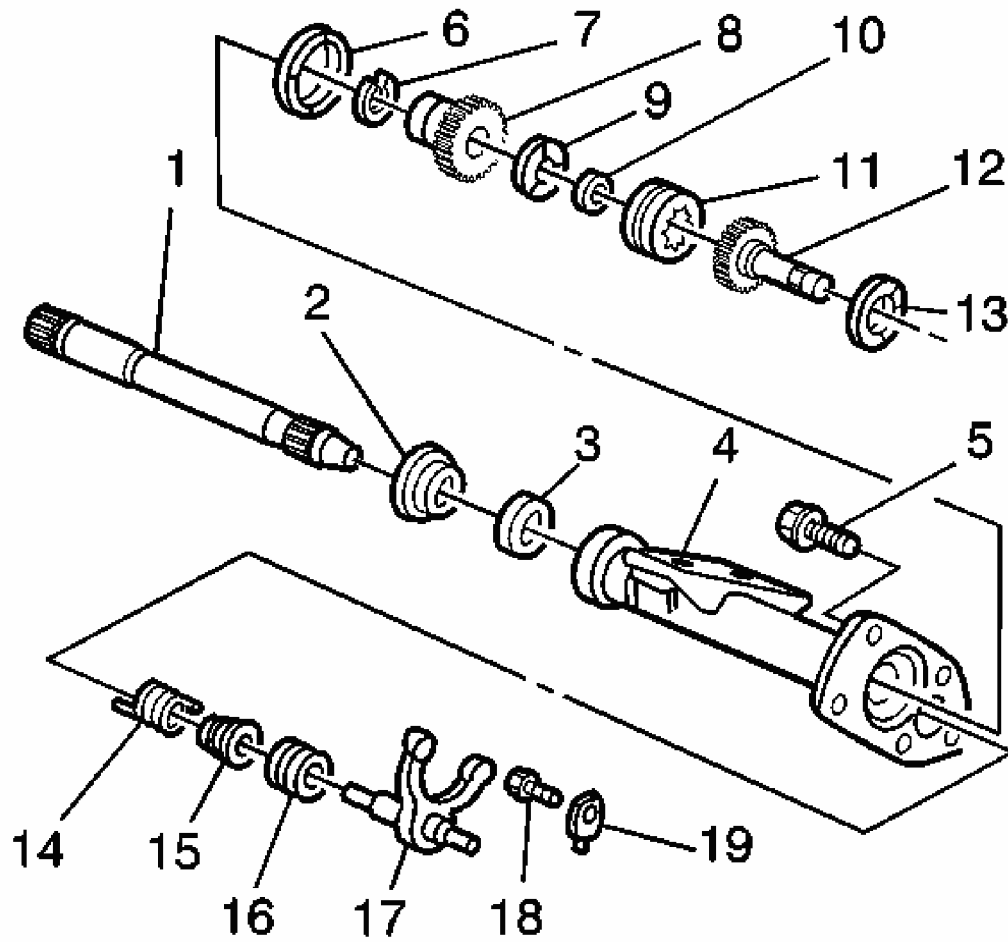


Fig. 141: Locating Inner Axle Shaft Housing Components
 Courtesy of GENERAL MOTORS CORP.

23. Install the following components into the inner axle shaft housing:
 - The thrust washer (9)
 - The clutch fork inner spring (16)
 - The clutch fork (17)
 - The clutch fork sleeve (11)
24. Apply sealant, GM P/N 1052492 or equivalent, to the inner axle housing to differential carrier sealing surface.
25. Install the inner axle shaft housing to the differential carrier assembly.
26. Install the 2 upper inner axle shaft housing bolts.

Tighten the bolts finger tight.

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27. The clutch cable retainer spring to the clutch fork.
28. Install the clutch cable housing.
29. Install the clutch cable housing bolts.

Tighten: Tighten the inner axle shaft housing and the clutch cable housing bolts to 48 N.m (36 lb ft).

30. Install the drain plug and the washer.
31. Install the fill plug and the washer.

Tighten: Tighten the drain plug and the fill plug to 33 N.m (24 lb ft).

32. Install the four-wheel drive indicator switch.

Tighten: Tighten the four-wheel drive indicator switch to 5 N.m (44 lb in).

GEAR TOOTH CONTACT PATTERN INSPECTION

The contact pattern check is not a substitute for adjusting the pinion depth and backlash. Use this method in order to verify the correct running position of the ring gear and the drive pinion. Gear sets which are not positioned properly may be noisy and/or have a short life. A pattern check ensures the best contact between the ring gear and the drive pinion for low noise and long life.

Gear Tooth Nomenclature

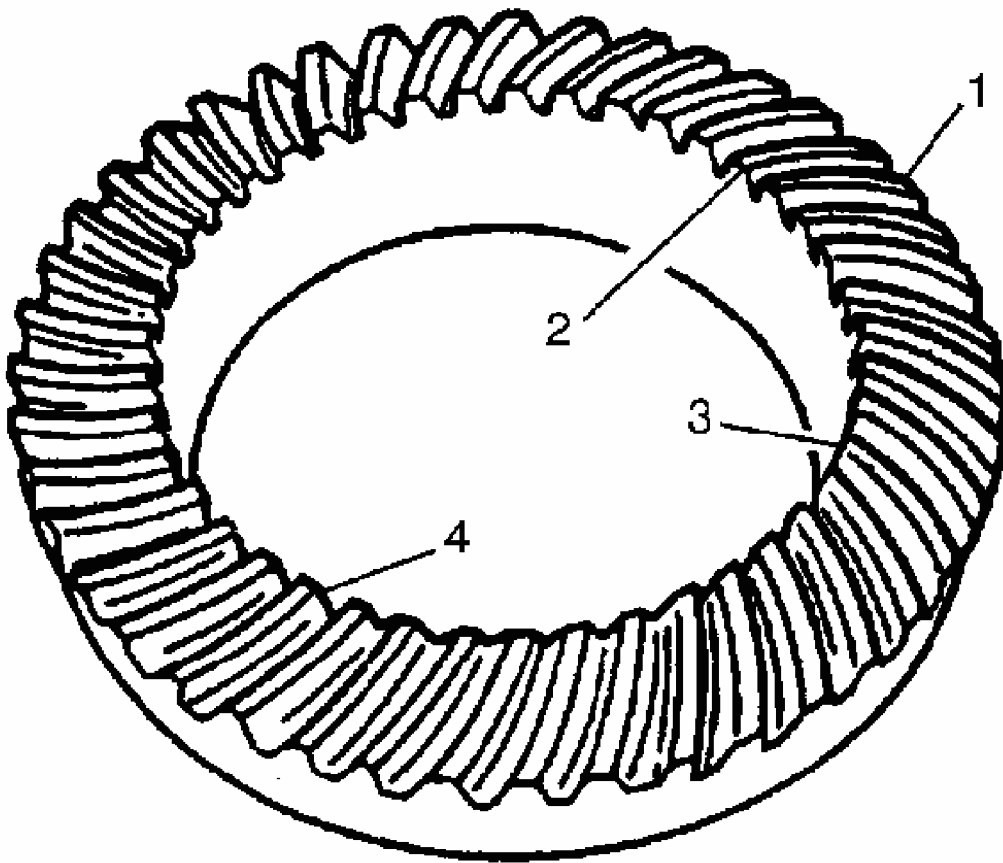


Fig. 142: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS CORP.

The side of the ring gear tooth which curves outward, or is convex, is the drive side (4). The concave side is the coast side (3). The end of the tooth nearest the center of the ring gear is the toe end (2). The end of the tooth farthest away from the center is the heel end (1).

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

The effects of bearing preloads are not readily apparent on hand-loaded tooth contact pattern tests. However, bearing preloads should be within specifications before proceeding with backlash and pinion depth adjustments.

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Pinion Depth Adjustment

Adjust the position of the pinion by increasing or decreasing the distance between the pinion head and the centerline of the ring gear. Decreasing the distance moves the pinion closer to the centerline of the ring gear. Increasing the distance moves the pinion farther away from the centerline of the ring gear.

Backlash Adjustment

Adjust the backlash by means of moving the side bearing adjuster sleeves which move the case and ring gear assembly closer to or farther from the pinion. Also use the adjuster sleeves in order to set the side bearing preload.

- If the left side adjuster sleeve is moved in, along with an equal outward movement of the right side adjuster, the backlash will increase.
- If the left side adjuster sleeve is moved out, along with an equal inward movement of the right side adjuster, the backlash will decrease.

Testing Procedure

1. Wipe clean the differential case, the ring gear and the differential carrier housing of lubricant. Carefully clean each tooth of the ring gear.

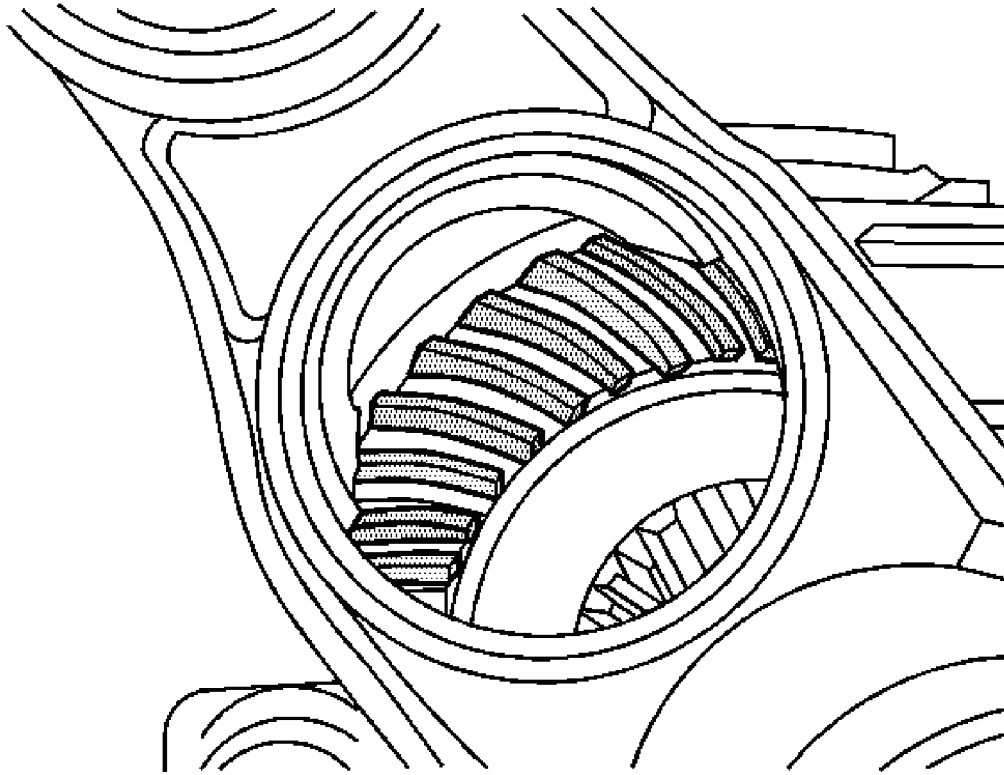


Fig. 143: View Of Ring Gear
Courtesy of GENERAL MOTORS CORP.

2. Use a medium stiff brush in order to sparingly apply gear marking compound GM P/N 1052351 (Canadian P/N 10953497) or equivalent to all of the ring gear teeth.

IMPORTANT: Avoid turning the ring gear excessively.

3. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates at least 3 full revolutions.
4. Turn the drive pinion flange/yoke in the opposite direction so that the ring gear rotates at least 3 full revolutions in the opposite direction.
5. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.

Correct Contact Pattern

Condition

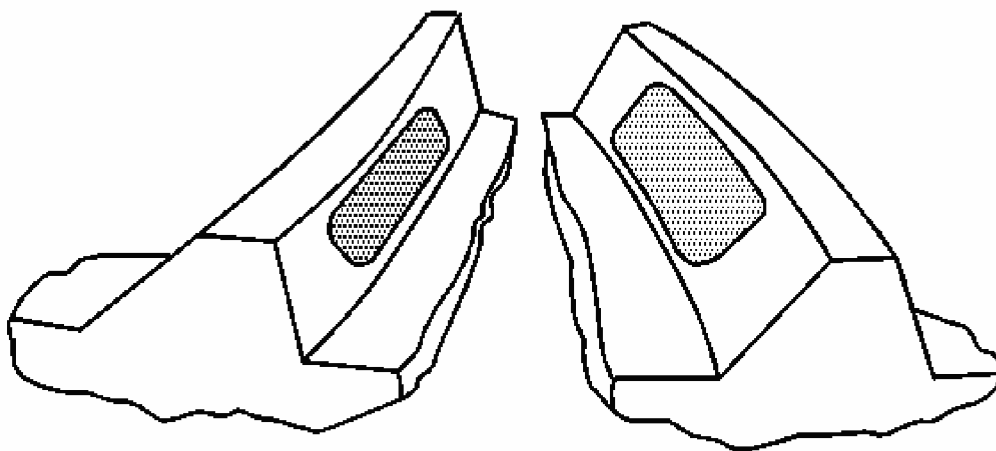


Fig. 144: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

The backlash and pinion depth is correct.

Correction

None required.

Service Hints

Loose bearing on the drive pinion or in the differential case may cause patterns that vary. If the contact pattern varies, inspect the following preload settings:

- Total assembly
- Differential case
- Drive pinion

If these settings are correct, inspect for damage or incorrectly assembled parts.

Drive Side Heel - Coast Side Toe Contact Pattern

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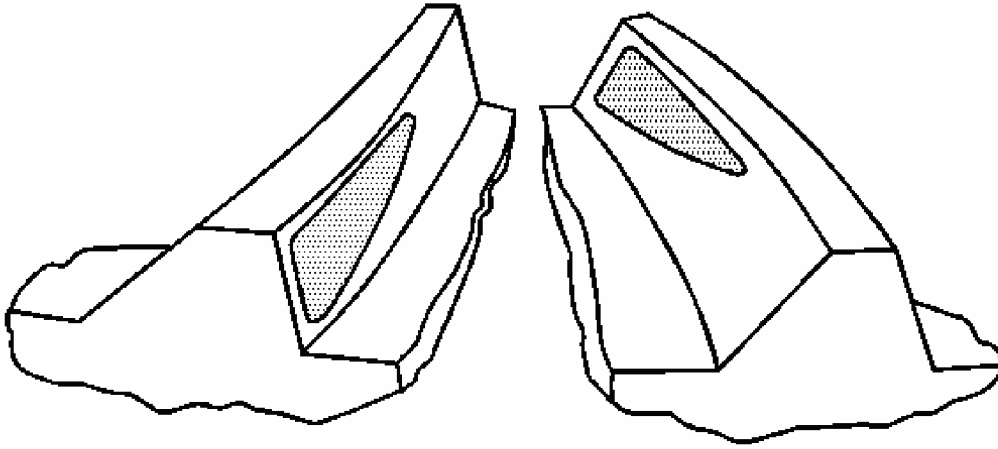


Fig. 145: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The pinion depth is incorrect. The drive pinion is too far away from the ring gear.

Correction

Adjust the pinion depth of drive pinion. Refer to **Pinion Depth Adjustment**.

Drive Side Toe - Coast Side Heel Contact Pattern

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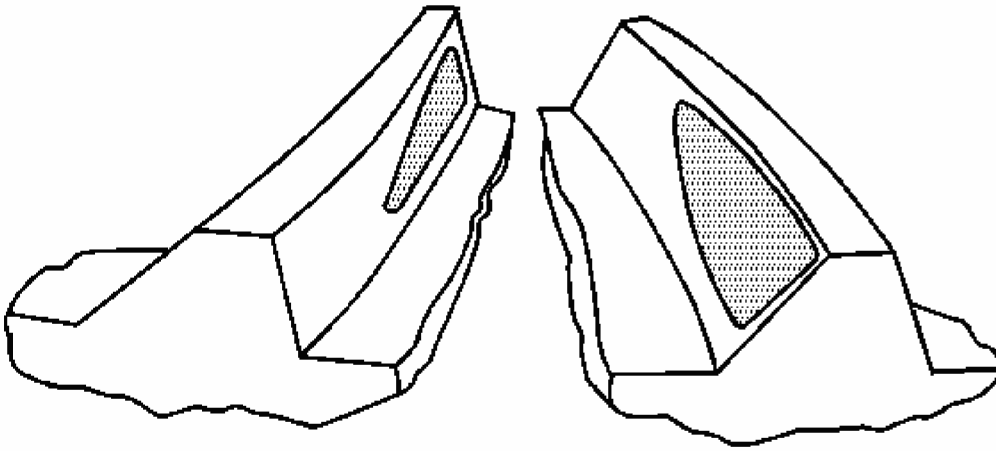


Fig. 146: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The pinion depth is incorrect. The drive pinion is too close to the ring gear.

Correction

Adjust the pinion depth of drive pinion. Refer to **Pinion Depth Adjustment**.

Drive Side Heel - Coast Side Heel Contact Pattern

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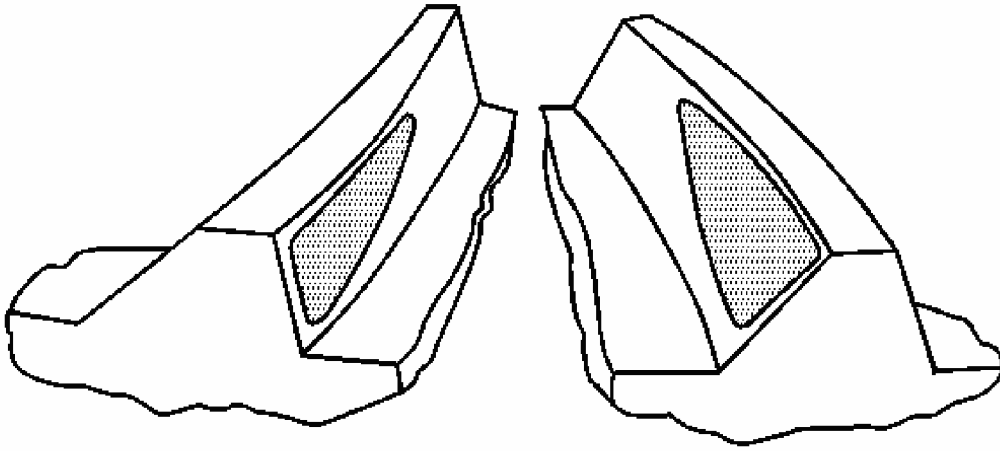


Fig. 147: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too far away from the drive pinion.

Correction

Decrease the backlash. Move the ring gear closer to the drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

Drive Side Toe - Coast Side Toe Contact Pattern

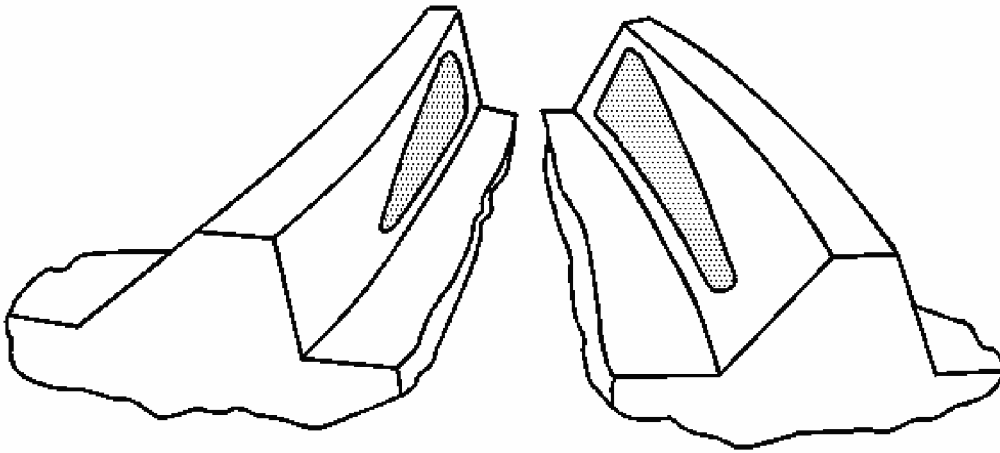


Fig. 148: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too close to the drive pinion.

Correction

Increase the backlash. Move the ring gear away from the drive pinion by adjusting the side bearing adjuster sleeves. Refer to **Backlash Inspection and Adjustment**.

DESCRIPTION AND OPERATION

FRONT DRIVE AXLE DESCRIPTION AND OPERATION

The Front Drive Axle consist of the following components:

- Differential Carrier Housing
- Differential Assembly
- Left and Right Output Shafts
- Inner Axle Shaft Housing
- Inner Axle Shaft
- Shift Fork Actuator

The front axle on four wheel drive model vehicles has a central disconnect feature. The axle uses a conventional ring and pinion gear set in order to transmit the driving force of the

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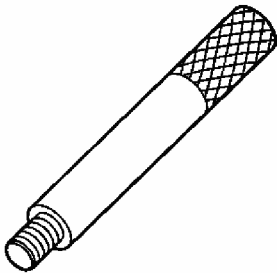
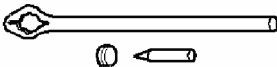
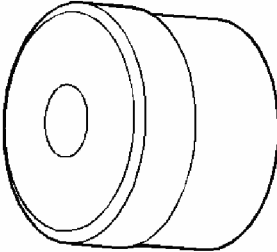
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engine to the wheels. The open differential allows the wheels to turn at different rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within the carrier. The axle identification number on top of the differential carrier assembly or on a label on the right half of differential carrier assembly. The drive axles are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

SPECIAL TOOLS AND EQUIPMENT

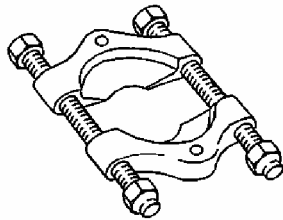
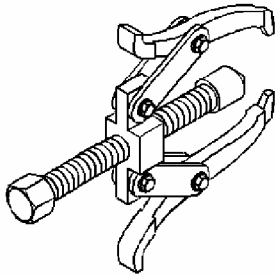
SPECIAL TOOLS

Special Tools

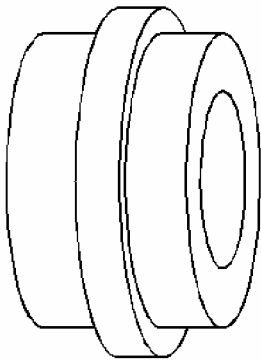
Illustration	Tool Number/Description
	J 8092 Driver Handle
	J 8614-O1 Flange/Pulley Holder Tool
	J 21551 Output Shaft Bearing Remover
	J 22888-20A Side Bearing Remover Kit

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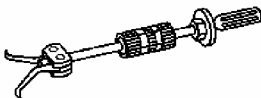
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J 22912-01
Pinion Bearing Remover



J 23423-A
Side Bearing Cup Installer

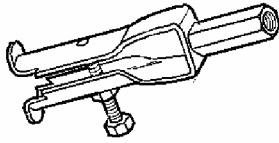


J 23907
Slide Hammer

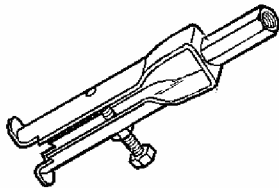
J 29369-1
Bushing/Bearing Remover

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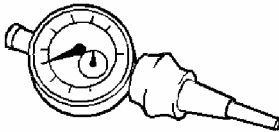
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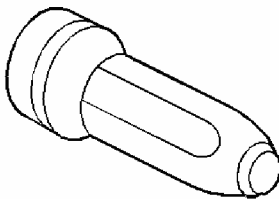
J 29369-2
Bushings/Bearing Remover (2"-3")



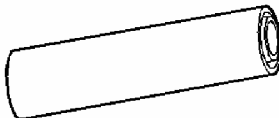
J 29763
Dial Indicator



J 33782
Pinion Oil Seal Installer



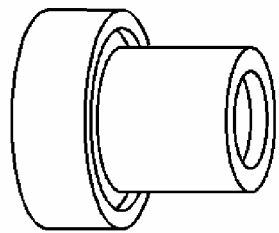
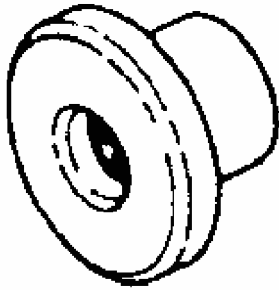
J 33785
Pinion Bearing Installer



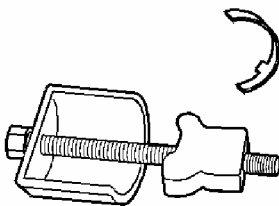
J 33788
Output Shaft Bearing Installer

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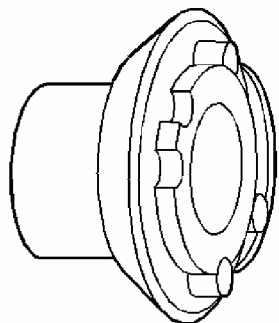
2004 DRIVELINE/AXLE Front Drive Axle - Blazer/S-10, Jimmy/Sonoma



J 33790
Differential Side Bearing Installer



J 33791
Bushings Remover and Installer Set

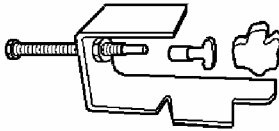
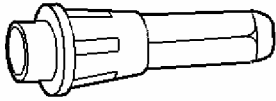


J 33792
Side Bearing Adjuster Socket

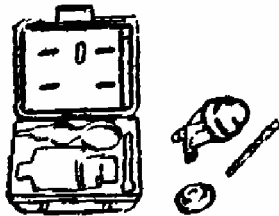
J 33799
Shift Cable Housing Seal Installer

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J 33837
Pinion Bearing Cup Remover and Installer

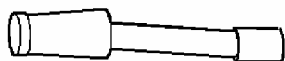
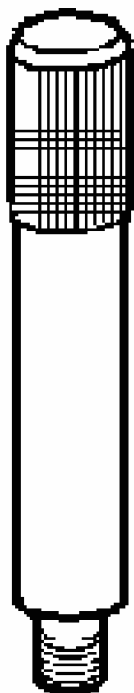


J 33838
Pinion Shim Setting Gage

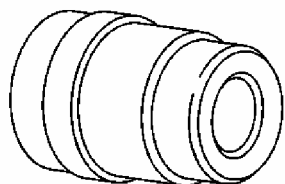
J 33842
Pilot Bearing Installer

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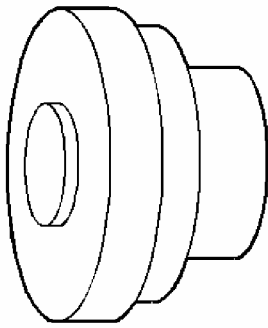
J 34011
Pilot Bearing Remover



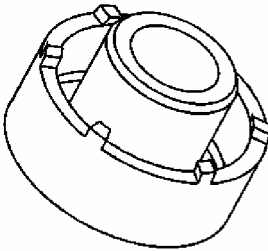
J 36611
Output Shaft Bearing Remover

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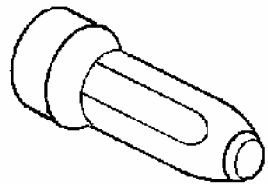
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J 42211
Shaft Seal Installer



J 42213
Side Bearing Adjuster Socket



J 42738
Front Output Shaft Seal Installer